

# **TWR Lighting, Inc.** HARK<sup>®</sup>

*Enlightened Technology<sup>®</sup>*

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## **IMPORTANT!!!**

PLEASE TAKE THE TIME TO FILL OUT THIS FORM COMPLETELY. FILE IT IN A SAFE PLACE. IN THE EVENT YOU EXPERIENCE PROBLEMS WITH OR HAVE QUESTIONS CONCERNING YOUR CONTROLLER, THE FOLLOWING INFORMATION IS NECESSARY TO OBTAIN PROPER SERVICE AND PARTS.

MODEL # \_\_\_\_\_ E-2/3DBSL \_\_\_\_\_

SERIAL # \_\_\_\_\_

PURCHASE DATE \_\_\_\_\_

PURCHASED FROM \_\_\_\_\_

# **TWR Lighting, Inc.** HARK<sup>®</sup>

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **TABLE OF CONTENTS**

<b>1.0</b>	<b><u>INTRODUCTION</u></b> .....	<b>1</b>
1.1	APPLICATION.....	1
1.2	SPECIFICATIONS OF EQUIPMENT.....	1
<b>2.0</b>	<b><u>INSTALLATION</u></b> .....	<b>2</b>
2.1	POWER SUPPLY CONTROL CABINET MOUNTING .....	2
2.2	PHOTOCELL HOUSING .....	3
2.3	PHOTOCELL WIRING .....	3
2.4	POWER WIRING.....	4
2.5	TOWER LIGHTING KIT.....	4
2.5.1	LED DUAL BEACON MOUNTING AND WIRING .....	4
2.5.2	TOWER KIT WIRING .....	5
2.6	ALARM WIRING.....	8
2.6.1	WHITE STROBE FAILURE (SF).....	8
2.6.2	LED RED BEACON BURNOUT (BB) .....	8
2.6.3	POWER FAILURE (PF).....	9
2.6.4	PHOTOCELL (PC) .....	9
2.6.5	SIDELIGHT ALARM (SL).....	9
2.6.6	LIGHTS ON (LO).....	9
2.7	ALARM TESTING.....	9
2.7.1	WHITE STROBE FAILURE (SF).....	9
2.7.2	LED RED BEACON BURNOUT (BB) .....	10
2.7.3	POWER FAILURE (PF).....	10
2.7.4	PHOTOCELL (PC) .....	10
2.7.5	SIDELIGHT ALARM (SL).....	10
2.8	CONTROLLER CONFIGURATION.....	11
<b>3.0</b>	<b><u>THEORY OF OPERATION</u></b> .....	<b>12</b>
3.1	THE POWER SUPPLY .....	12
3.2	THE FLASHTUBE .....	13
3.3	TIMING CIRCUIT.....	13
3.4	TRIGGER CIRCUIT .....	14

# **TWR Lighting, Inc.** **HARK**<sup>®</sup>

*Enlightened Technology*<sup>®</sup>

## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

---

### **TABLE OF CONTENTS** (CONTINUED)

<b>3.5</b>	<b>ALARM CIRCUITS .....</b>	<b>14</b>
3.5.1	RED LIGHT ON (LO).....	14
3.5.2	WHITE STROBE FAILURE (SF).....	14
3.5.3	LED RED BEACON BURNOUT (BB) .....	14
3.5.4	POWER FAILURE (PF).....	14
3.5.5	PHOTOCELL (PC) .....	15
3.5.6	SIDELIGHT ALARM (SL).....	15
<b>3.6</b>	<b>BLEEDER CIRCUIT .....</b>	<b>15</b>
<b>3.7</b>	<b>STROBE DIAGNOSTIC CIRCUITS.....</b>	<b>16</b>
3.7.1	CONTROL POWER ON.....	16
3.7.2	HIGH VOLTAGE .....	16
3.7.3	TRIGGER VOLTAGE .....	16
3.7.4	NIGHTMODE.....	17
3.7.5	PRIMARY TIMING.....	17
3.7.6	TIMING SIGNAL VERIFY.....	17
3.7.7	FLASH VERIFIED .....	17
3.7.8	STROBE FAIL TEST.....	18
<b>3.8</b>	<b>LED DUAL BEACON .....</b>	<b>18</b>
<b>4.0</b>	<b><u>TROUBLESHOOTING</u> .....</b>	<b>19</b>
4.1	TOOL REQUIREMENTS.....	19
4.2	DIAGNOSTIC EVALUATION .....	19
4.3	TROUBLESHOOTING ASSISTANCE.....	20
4.3.1	FLASH VERIFY LED – OUT .....	20
4.3.2	CONTROL POWER ON LED – OUT .....	20
4.3.3	PRIMARY TIMING LED – OUT .....	20
4.3.4	FALSE OR NONEXISTENT LED BEACON ALARMS (SF).....	20
4.3.5	LED BEACON FLASHER FAILURE (BB) .....	21
4.3.6	NO LED BEACON OPERATION.....	21
<b>5.0</b>	<b><u>MAINTENANCE GUIDE</u> .....</b>	<b>23</b>
5.1	FLASHTUBE REPLACEMENT .....	23
5.2	RED OBSTRUCTION LIGHTING.....	24
5.3	PHOTOCELL.....	24

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

---

### **TABLE OF CONTENTS** (CONTINUED)

<b>6.0</b>	<b>MAJOR COMPONENTS LIST .....</b>	<b>25</b>
<b>7.0</b>	<b>SUGGESTED SPARE PARTS LIST .....</b>	<b>29</b>

**WARRANTY & RETURN POLICY**

**RETURN MERCHANDISE AUTHORIZATION (RMA) FORMS**

# **TWR Lighting, Inc.** HARK<sup>®</sup>

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

---

### APPENDIX

CHASSIS COMPONENT LAYOUT .....	H40-301 (REV U)
SCHEMATIC LAYOUT .....	M01-301 (REV K)
HOUSING DETAIL.....	HD0-301 (REV B)
INSTALLATION GUIDELINE .....	INS-301 (REV B)
PHOTOCELL HOUSING DETAIL.....	100239 (REV H)
TOWER LIGHTING KIT 351' TO 500' .....	603 (REV D)
SIDELIGHT MOUNT ASSEMBLY .....	100489 (REV A)
L865/864 LED DUAL BEACON ASSEMBLY.....	101008i (REV A)
CONTROL PCB #1 .....	H01-258 (REV F)
HIGH VOLTAGE RECTIFIER PCB.....	H02-258A (REV C)
RELAY PCB w/ALARM LOCKOUT ELIMINATION MODIFICATION.....	H03-301A
OL1VLED2 (L810 OBSTRUCTION LIGHT) .....	100656 (REV E)
LED BEACON AND SIDELIGHT CURRENT SENSOR .....	101088 (REV B)
JUNCTION BOX DETAIL .....	100089 (REV A)
LK5E2/3DBSL .....	603-07 (REV A)
WRAPLOCK FASTENING DETAIL.....	100984

# **TWR Lighting, Inc.** **MARK**

*Enlightened Technology*

## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **1.0 INTRODUCTION**

The TWR Lighting®, Inc. (TWR®) Model E-2/3DBSL Type L-864/L-865 Controller has been designed and built to the Federal Aviation Advisory Circular 150/5345-43G with safety and reliability in mind. TWR® is committed to providing our customers with some of the best products and services available. TWR® welcomes you to our family of fine products and we look forward to servicing your needs now and in the future. **NOTE:** Structures exceeding 500' will require to be painted, in addition to this lighting, for added visual hazard marking.

### **1.1 APPLICATION**

The E-2/3DBSL Controller is for use on lighting structures or towers 351' to 700' AGL (above ground level) that are approved to be lighted with Medium Intensity Dual White Strobe/Red LED in accordance with the FAA Advisory Circular 70/7460-1K.

### **1.2 SPECIFICATIONS OF EQUIPMENT**

Dimensions:

Controller (H x W x D)/Weight	29.52" x 19.68" x 11.81"/115.0 lbs.
Mounting Dim (H x W)	31.10" x 18.11"
Beacon Height/Weight	26.25" /75 lbs.
Cable Diameter/Weight per 100 ft.	625" +/- 10% 24 lbs.

Electrical Voltage:

120V AC +/- 10% 60 Hz (Standard)
240V AC +/- 10% 60 Hz (Available)

Intensity:

White Daymode	20,000 +/- 25% Effective Candelas
Red Nightmode	2,000 +/- 25% Effective Candelas
White Nightmode (Back-up mode)	2,000 +/- 25% Effective Candelas

Beam Spread:

Horizontal	360°
Vertical	3° Minimum

Flash Rate:

White Daymode	40 fpm +/- 2 fpm
Red Nightmode	30 fpm +/- 10 fpm
White Nightmode (Back-up mode)	40 fpm +/- 2 fpm

Wattage:

Daymode	285 Watts
Red Nightmode	135 Watts
White Nightmode	105 Watts

Temperature:

+55°C / -55°C

Beacon Wind Load:

2.1 ft<sup>2</sup>

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### **2.0 INSTALLATION**

#### **WARNING - DANGER!!**

**THIS SYSTEM OPERATES AT HIGH VOLTAGE LEVELS THAT COULD BE LETHAL TO SERVICE PERSONNEL. ALL INSTALLATION AND MAINTENANCE WORK SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL ONLY. WHEN PERSONNEL IS INSTALLING SYSTEM OR PERFORMING MAINTENANCE ON THIS SYSTEM, MAKE SURE THE POWER IS TURNED OFF AT THE SERVICE BREAKER PANEL!!**

**READ AND UNDERSTAND THE THEORY OF OPERATION AND ITS SAFETY MESSAGES BEFORE ATTEMPTING INSTALLATION/MAINTENANCE OF THIS SYSTEM. DO NOT ATTEMPT TO DEFEAT THE INTERNAL SAFETY SWITCHES IN THE CONTROLLER AND BEACONS!!**

#### **2.1 POWER SUPPLY CONTROL CABINET MOUNTING**

The power supply control cabinet can be located at the base of the structure or in an equipment building. Mounting Dimensions can be found in Section 1.2, on page 1. Pay particular attention when choosing your controller mounting location to ensure proper door opening and room for service personnel. Refer to installation drawings INS-301, and HDO-301, for ease of install.

#### **2.2 PHOTOCELL HOUSING**

The standard photocell housing is supplied with a 20' pigtail of 16 AWG TYPE TFFN wire. On occasion, in mounting of the photocell, an additional amount of wire may be required. Refer to drawing 100239, for proper assistance on determining gauge of wire for your specific needs.

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **2.3 PHOTOCELL WIRING**

(Refer to Drawings HDO-301, and H40-301)

If the control cabinet is mounted inside an equipment building, the photocell should be mounted vertically on ½" conduit outside the building above the eaves facing north. Wiring from the photocell housing socket to the control cabinet should consist of one (1) each; red, black, and white wires. The white wire is connected to the socket terminal marked "N," the black wire is connected to the socket terminal marked "Li," and the red wire is connected to the socket terminal marked "Lo." The photocell should be positioned so that it does not "see" ambient light, which would prevent it from switching to the nightmode.

If the control cabinet is mounted outside an equipment building, the photocell should be mounted vertically on ½" conduit so the photocell is above the control cabinet. Care must be taken to assure that the photocell does not "see" any ambient light that would prevent it from switching into the nightmode. The photocell housing socket wiring is the same as above.

2.3.1 Connect the **BLACK** wire from the photocell to terminal block TB3-PL.

2.3.2 Connect the **RED** wire from the photocell to terminal block TB3-SSR.

2.3.3 Connect the **WHITE** wire from the photocell to terminal block TB3-N.

2.3.4 Install the photocell into the receptacle and twist to the right while depressing to lock into place.

### **2.4 POWER WIRING**

(Refer to Drawing H40-301)

Power wiring to the control cabinet should be in accordance with local methods and National Electric Codes (NEC).

2.4.1 A 30 amp circuit breaker is recommended at service panel

2.4.2 Connect the "HOT" side of the 120V AC line to TB1-14.

2.4.3 Connect the "NEUTRAL" side of the 120V AC line to TB1-15.



## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

---

2.4.4 Connect the AC ground to the ground lug to the lower right of the terminal block TB1.

2.4.5 Controller panel should be connected to the tower and/or building grounding system with the exception of installations on AM RF.

Applications where controller grounding to earth ground is prohibited. Ground the controller only to the tower itself using a suitable RF ground.

### **2.5 TOWER LIGHTING KIT**

When installing this system, the customer will need to use strobe cable method to wire the LED dual beacons. Refer to Lighting Kit Drawing 603, for cable installations.

## **WARNING DANGER!!!**

**THIS SYSTEM OPERATES AT HIGH VOLTAGE LEVELS THAT COULD BE LETHAL TO SERVICE PERSONNEL. ALL INSTALLATION AND MAINTENANCE WORK SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL ONLY. WHEN PERSONNEL IS INSTALLING SYSTEM OR PERFORMING MAINTENANCE ON THIS SYSTEM, MAKE SURE THE POWER IS TURNED OFF AT THE SERVICE BREAKER PANEL!!**

**READ AND UNDERSTAND THE THEORY OF OPERATION AND ITS SAFETY MESSAGES BEFORE ATTEMPTING INSTALLATION/MAINTENANCE OF THIS SYSTEM. DO NOT ATTEMPT TO DEFEAT THE INTERNAL SAFETY SWITCHES IN THE CONTROLLER AND BEACONS!!**

2.5.1 Beacon Mounting and Wiring  
(Refer to Drawings HDO-301, and INS-301)

2.5.1.1 Bolt the beacon to the mounting plate using four 5/8" x 1-1/4" galvanized bolts that are supplied. Installer should make sure to check for full thread engagement on Anco locknut. Allow 16" clearance in back of the hinge (25" from the center of the base) to tilt lens back without hitting an obstruction.

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## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

---

2.5.1.2 Level the beacon using the spirit level at the base of the lens. Shims may be used under the LED dual beacon base or triple nutting each bolt with palnuts on all four (4) nuts.

2.5.1.3 Slip the electrical cable for the LED dual beacon through the watertight connector (cable gland bushing) and tighten the gland nut to make a watertight seal. Attach the wires to the terminal strip as follows:

Wire color	to match	Lamp platform wire color	Terminal Block No.
10 Gauge Red		16 Gauge Red/White	1
14 Gauge White/Green		16 Gauge White/Green	2
16 Gauge Brown		18 Gauge Brown	3
16 Gauge Blue		18 Gauge Blue	4
10 Gauge Black		16 Gauge Black	5
14 Gauge White		16 Gauge White	6
14 Gauge Green		16 Gauge Green	7
10 Gauge Red/Black		16 Gauge Red/Black	8
16 Gauge Bare Wire		Beacon Base	

### 2.5.2 Tower Kit Wiring

Install wiring between the controller and the LED dual beacon utilizing strobe cable method. Refer to drawings HDO-301, and 603, for installation of light kits. Following these minimum guidelines as well as any local or end user addition requirements, installing light kits will require lifting of the cable by the supplied cable grip or conduit to affix to the tower. Always work safely and adhere to all OSHA Safety Guidelines when lifting wiring or working on the structure or tower itself. It is the installer’s responsibility to install the lighting kit in a safe manner. Installers can request from OSHA their requirements 29CFT 1926.21, and 29CFR 1926.105, to ensure compliance to regulations.

***NOTE: On occasion, a set of custom lighting kit drawings may be specifically requested by a customer and installed in this manual. In cases such as this, the drawings will precede the manual if a conflict occurs.***

## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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All the necessary information for wiring the LED dual beacons and LED sidelights is contained on the tower kit drawing 603. The connections for the LED dual beacons and LED sidelights in the controller are as follows:

- 2.5.2.1 Connect the 10 gauge **Red/Black** wire from LED dual beacon #1 wiring to TB1-1.
- 2.5.2.2 Connect the 10 gauge **Red** wire from LED dual beacon #1 wiring to fuse block marked B1.
- 2.5.2.3 Connect the 10 gauge **Black** wire from LED dual beacon #1 wiring to TB1-2.
- 2.5.2.4 Connect the 14 gauge **White** wire from LED dual beacon #1 wiring to TB1-3.
- 2.5.2.5 Connect the 10 gauge **Red/Black** wire from LED dual beacon #2 wiring to TB1-4.
- 2.5.2.6 Connect the 10 gauge **Red** wire from LED dual beacon #2 wiring to fuse block marked B2.
- 2.5.2.7 Connect the 10 gauge **Black** wire from LED dual beacon #2 wiring to TB1-5.
- 2.5.2.8 Connect the 14 gauge **White** wire from LED dual beacon #2 wiring to TB1-6.
- 2.5.2.9 Connect the 10 gauge **Red/Black** wire from LED dual beacon #3 wiring to TB1-7.
- 2.5.2.10 Connect the 10 gauge **Red** wire from LED dual beacon #3 wiring to fuse block marked B2.
- 2.5.2.10 Connect the 10 gauge **Black** wire from LED dual beacon #3 wiring to TB1-8.

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

---

- 2.5.2.11 Connect the 14 gauge **White** wire from LED dual beacon #3 wiring to TB1-9.
- 2.5.2.12 Connect the 14 gauge **White/Green** wire from LED dual beacons #1, 2, and 3 wiring to TB3-N.
- 2.5.2.13 Connect the 14 gauge **Green** wire from LED dual beacon #1 to the ground lug located to the lower left of TB1.
- 2.5.2.14 Connect the 14 gauge **Green** wires from LED dual beacons #2 and #3 to the ground lug located to the lower left of TB1.
- 2.5.2.15 Connect the 16 gauge Bare Drain wire (if strobe cable install) from LED dual beacon #1 to the ground lug located to the left of TB1.
- 2.5.2.16 Connect the 16 gauge Bare Drain wire (if strobe cable install) from LED dual beacon #2 to the ground lug located to the left of TB1.
- 2.5.2.17 Connect the 16 gauge Bare Drain wire (if strobe cable install) from LED dual beacon #3 to the ground lug located to the lower left of TB1.
- 2.5.2.18 Connect the 16 gauge **Brown** wire from LED dual beacon #1 wiring to TB1-10.
- 2.5.2.19 Connect the 16 gauge **Blue** wire from LED dual beacon #1 to TB1-11.
- 2.5.2.20 Connect the 16 gauge **Blue** wire from LED dual beacon #2 to TB1-11.
- 2.5.2.21 Connect the 16 gauge **Brown** wire from LED dual beacon #2 to TB1-12.
- 2.5.2.22 Connect the 16 gauge **Brown** wire from LED dual beacon #3 to TB1-12.

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

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- 2.5.2.23 Connect the 16 gauge **Blue** wire from LED dual beacon #3 to TB1-13.
- 2.5.2.24 Connect the **Red** wire from the LED Sidelight #1 to fuse block marked S.
- 2.5.2.25 Connect the **Yellow** wire from the LED Sidelight #2 to fuse block marked S.
- 2.5.2.26 Connect the **White Neutral** wire from LED Sidelights #1 and #2 to TB3-N.
- 2.5.2.27 Connect the **Green** ground wire (if cable is used) from the LED Sidelights #1 and #2, wiring the ground lug located to the left of TB1.

### 2.6 ALARM WIRING

Alarm contacts (Form C) are provided for strobe failures, power failure and photocell on. It is left up to the customer or installer on how they choose to utilize these contacts with their monitoring equipment. External monitoring equipment is available. Please inquire within the sales staff at the factory for models available and pricing. Alarm configurations are shown on drawings H40-301, and M01-301.

#### 2.6.1 White Strobe Failure (SF)

Connect the customer's alarm common to plug J3, terminal #5. Connect the customer's alarm wire to plug J3, terminal #6, for normally open (or) terminal #4, for normally closed monitoring.

#### 2.6.2 Red LED Beacon Failure (BB)

Connect the customer's alarm common to plug J3, terminal #14. Connect the customer's alarm wire to plug J3, terminal #13, for normally open (or) terminal #15, for normally closed monitoring.

**NOTE: All three (3) red light alarms are grouped due to the fail-safe operation.**

## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### 2.6.3 Power Failure (PF)

Connect the customer's alarm common to plug J3, to terminal #11. Connect the customer's alarm wire to plug J3, terminal #12, for normally open (or) terminal #10, for normally closed monitoring.

### 2.6.4 Photocell (PC)

Connect the customer's alarm common to plug J3, terminal #17. Connect the customer's alarm wire to plug J3, terminal #16, for "off" operation (or) terminal #18, for "on" operation monitoring.

### 2.6.5 Sidelight Alarm (SL)

Connect the customer's alarm common to M1, terminal #11. Connect the customer's alarm wire to M1, terminal #14, for normally open (or) terminal #12, for normally closed monitoring.

### 2.6.6 Lights On (LO)

Connect the customer's alarm common to J3, terminal #8. Connect the customer's alarm wire to J3, terminal #7, for normally open (or) terminal #9, for normally closed monitoring.

## **2.7 ALARM TESTING**

To test alarms, follow these procedures using an "ohm" meter between alarm common and alarm points.

### 2.7.1 White Strobe Failure (SF)

White strobe failure testing can be performed in the daymode operation. Check for status of the LED dual beacon. Turn "off" switch S1, on PCB #1, and status should change after a four (4) second delay. After test, turn S1 to the normal operating position.

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### 2.7.2 LED Dual Beacon Failure (BB)

LED Dual Beacon failure testing can be performed in the nightmode operation. Check for status of the LED dual beacon. Turn "on" switch SW3 (up position) on controller panel and status should change to red nightmode. Pull the B1 open. (Alarm should be prompt after 30 seconds.) This testing will cause the unit to go into the back-up white strobe operation. To clear this situation, turn off SW3 (down position), re-engage B1, and reset the breaker.

### 2.7.3 Power Failure (PF)

While the controller is in normal operation, shut off power to the controller at the breaker panel. Alarm should be prompt. Reset the breaker to resume normal operation.

### 2.7.4 Photocell (PC)

Controller should be in daymode operation when performing this test. Check status of operation. Turn SW3 on (up position) (or) cover the photocell and operation status should change state. After test, turn SW3 to normal operating position (down position), or uncover photocell.

### 2.7.5 LED Sidelight Alarm (SL)

Controller should be in nightmode operation. Check status of operation. Pull fuse switch marked S. Alarm should occur within thirty (30) seconds. After test, re-engage fuse switch S.

**DUAL MEDIUM INTENSITY LED/STROBE  
MODEL E2/3DBSL CONTROLLER**

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**2.8 CONTROLLER CONFIGURATION**  
(Refer to Drawing H01-301)

This unit is factory setup to be a master controller. If this unit is to be used in conjunction with an additional unit, change dip switch settings as drawing indicates. The following connections will need to be interfaced between systems.

- 2.8.1 Connect at least an 18/20 gauge wire from PCB #1, connector P1-15, from unit set-up to be the master unit to PCB #1, connector P1-15, of unit set-up to be the slave unit.
- 2.8.2 Connect at least an 18/20 gauge wire from TB3-SSR of master unit to slave unit TB3-SSR.
- 2.8.3 Connect at least an 18/20 gauge wire (ground) from one (1) chassis to the other chassis.
- 2.8.4 Use a single breaker for supply power to all controllers.
- 2.8.5 Follow standard instructions provided in the manuals supplied with the controllers.



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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **3.0 THEORY OF OPERATION**

#### **3.1 THE POWER SUPPLY**

The AC line is sent to transformers T1, and T3, through fuses F1, F4, MOVMOD, and relay K1. In order for K1 to energize and complete the circuit to T1, and T3, the safety interlock switch (CSS & BSS) must be closed. The BSS switch is located in the base of the beacon. In order for the system to operate, the beacons and the power supply must be closed and secured. The CSS is located in the enclosure door of the control cabinet. This switch is a three (3) position switch that can be pulled-out or depressed by closing the door to complete the circuit.

Transformers T1, and T3, secondary outputs are around 1,000V AC. These outputs are sent to the high voltage rectifier PCB (PCB #2) and converts the 1,000V AC of each transformer to around +550V DC and -550V DC in daymode operation. This High voltage is then used to charge energy storage capacitors bank C103-C109, C111-C117, and C119-C125. Resistors R31, R33, and R35, are bypassed through K5A, K5B, and K5C during daymode operation.

When the light level drops below 3 foot candles, photocell 6390-FAA2 supplies 120V AC to relay K3, and energizes it. The power is switched from the T1 & T3 to the red beacon control circuit. That consists of a flasher (M3) and a timing module (M4), which flash the beacon, and current sensing modules (M2 & M2A), which detect failures.

In the event of an LED Beacon failure or Flasher Failure, the K9 relay (failsafe relay) will remove power from the K3, de-energizing it. The power is then switched back to the strobe control circuit (T1 & T3). The photocell continues to supply 120V AC to the controller. This voltage is supplied to K5A, K5B, and K5C, which removes C103-C109, C111-C117, and C119-C125 from the discharge path, leaving capacitors C102, C110, and C118, in the circuit for failsafe mode operation. Transformers T1 & T3 secondary outputs are converted from 1,000V AC at the PCB #2 to around +700V DC and -550V DC for failsafe mode operation. This high voltage is then used to charge the energy storage capacitors C102, C110, and C118, through current limiting resistors R31, R33, and R35, and steering diodes D5, D6, and D8. The energy storage capacitor banks are connected to the flashtube through the interconnecting tower wiring.

## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **3.2 THE FLASHTUBE**

The flashtubes FT1, FT2, and FT3 (daymode) are quartz tubes containing two (2) electrodes each. The electrode at the positive (+) end is called the anode and is connected to the positive side of the storage capacitors through inductors L1, L2, and L3. The electrode at the negative (-) end of the tube is called the Cathode and is connected to the negative side of the energy storage capacitors banks.

The flashtube contains a gas called Xenon. When the high voltage energy in the storage capacitors is connected to the flashtube, nothing will happen since Xenon in its natural state is not a conductor of electricity. However, when a very short duration high voltage pulse is impressed on the trigger element of the tube (via the power supply and trigger transformers T4, T5, and T6) the Xenon gas is ionized and thereby becomes a good conductor of electricity. This allows the electrical energy in the storage capacitors to discharge rapidly through the flashtube, which converts this energy to light energy and heat energy. When the voltage stored in the capacitors discharges to a low level, the Xenon gas can no longer sustain conduction and since the short trigger pulse is gone by this time, it de-ionizes returning to its non-conducting state until another trigger pulse arrives to repeat the process. Meanwhile, the storage capacitor is being re-charged by the transformer and the high voltage rectifiers.

### **3.3 TIMING CIRCUIT**

The timing circuit is contained entirely on printed circuit board #1. The timing circuit has its own power supply. This circuit converts the AC voltage to approximately 12V DC, which is used to supply all of the components in this circuit. It uses this low voltage DC to generate pulses that control the flash rate of the flashtube. It actually generates two (2) groups of pulses. The first is a pulse approximately once every 1.5 seconds to operate the flashtube during daylight hours. The second is a burst at 100Hz to elongate the apparent flash during the night time hours at reduced flash energy.

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

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### 3.4 TRIGGER CIRCUIT

The trigger circuit is supplied by transformer T3 secondary windings. The 250V AC is converted to DC, which is stored in a storage capacitor much like the action of the high voltage circuit. The main difference is that the storage capacitor is much smaller. The trigger circuit receives the pulses generated by the timing circuit. It releases its stored energy with each pulse and delivers it to the flashtube's trigger element to initiate each flash.

### 3.5 ALARM CIRCUITS

#### 3.5.1 Red Light On (LO)

Red Light On alarm circuit monitors Red LED Beacons on or off. If LED beacons are on, relay K7 (on PCB #3) will be engaged.

#### 3.5.2 White Strobe Failure (SF)

White Strobe Failure alarm circuit monitors each flash of the day mode flashtube within the beacon. If the flashtube fails to flash (for any reason) the alarm circuit operates relay K11 (on PCB #3) that the customer can connect to their alarm transmitting devices. The alarm point can be accessed on J3 of PCB #3.

#### 3.5.3 LED Dual Beacon (BB)

LED Dual Beacon failure alarm circuit monitors all three (3) LED beacons. If any LED Dual Beacon fails to flash (for any reason) the alarm circuit would operate relay K10 (on PCB #3) that the customer can connect to their alarm transmitting devices. The alarm point can be accessed on J3 of PCB #3.

#### 3.5.4 Power Failure (PF)

The power failure alarm relay is energized during normal operation. Should the power be removed for any reason, then relay K6 would drop, creating an alarm for the customer's alarm transmitting device.

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

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### 3.5.5 Photocell (PC)

The photocell alarm relay K4 is energized whenever the photocell or SW3 is on. This relay will allow the customer to monitor the modes of operation to determine if switch from daymode to nightmode has occurred.

### 3.5.6 Sidelight Alarm (SL)

Module M1 monitors the current flowing to the sidelights. This module can monitor from 3 mA to 1,000 mA. Factory setting is generally for six (6) lamps. When the current falls below to (5) amps (one [1] lamp less than the factory setting), then the onboard relay will engage, creating an alarm.

## 3.6 BLEEDER CIRCUIT

The bleeder circuit is the most important safety item in this system. It consists of resistors R32, R34, and R36, connected to the high voltage storage capacitor through relays K2, and K2A. When the AC line voltage is turned off, the relay will close allowing the resistors to discharge the high voltage stored in the capacitor banks below 50V in 30 seconds.

### \*\* CAUTION \*\*

**NEVER RELY ON THIS CIRCUIT TO RENDER THIS SYSTEM HARMLESS. ANY DEFECT IN THIS CIRCUIT COULD ALLOW A HAZARDOUS HIGH VOLTAGE CHARGE TO REMAIN ON THE STORAGE CAPACITORS. ALWAYS WAIT AT LEAST 30 SECONDS AFTER POWER HAS BEEN TURNED OFF BEFORE STARTING ANY WORK ON THIS SYSTEM. ALWAYS MEASURE THE VOLTAGE ON THE STORAGE CAPACITORS WITH A VOLTMETER BEFORE STARTING ANY OTHER WORK ON THIS SYSTEM. NEVER ATTEMPT TO DEFEAT THE SAFETY INTERLOCKS.**

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

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### 3.7 STROBE DIAGNOSTIC CIRCUITS

The diagnostic circuit is provided as a means of making system checks and maintenance more convenient. This circuit is entirely contained on the printed circuit boards PCB #1, and PCB #2. The circuits that are contained on PCB #1, and PCB #2, are as follows:

#### 3.7.1 Control Power On

Line from the 120V AC input is sent through safety switches CSS, BSS, isolation transformer T2, and fuse F3, on PCB #1. Once this low voltage is at PCB #1, it is rectified, and then sent to LED4 (D5). If for any reason power is interrupted, (beacons opened, controller door open, blown F3 fuse, failed relay, etc.) LED4 would be extinguished.

#### 3.7.2 High Voltage

The Cathode side of the high voltage HV1, HV2, and HV3, are routed through current limiting resistors (R201, R202, and R203). When the unit is in daymode, D14, D15, and D16 will be at full brightness when the capacitors are at full charge but, dims with the discharging of the storage capacitors. A constant intensity indicates that high voltage is present but capacitors are not discharging (check other indicators for fault). When the red LEDs fail to glow, then the high voltage is no longer present.

#### 3.7.3 Trigger Voltage

The trigger voltage from fuse F2 is sent to current limiting resistor R29, and LED6 (D20). Under normal circumstances, the red LED should be at full intensity, indicating voltage to be normal. An absence of this indication means that the voltage is no longer present.

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

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### 3.7.4 Nightmode

Output voltage from the photocell (SSR) is connected to the coil of relay K4 on PCB #3. Whenever the photocell senses the darkness, or switch SW3 is on, relay K4 will energize, thereby sending 120V to relay 1 on PCB #1 and the K3 relay. On the PCB #1, Relay 1 will supply 12V DC to LED7 (D7). LED7 will glow a constant red when in the nightmode. Relay K3 will energize, switching the power from T1 and T3 to the red light beacon control circuit.

### 3.7.5 Primary Timing

The primary timing pulses are received at LED8 (D12). LED8 will flash according to the pulses received from the timing circuit. If LED8 fails to flash, then the primary timing circuit has failed. Check LED9 (D28) for secondary timing operation. The strobe unit should produce 40 (+/- 2) pulses per minute in daymode or nightmode back-up operation.

### 3.7.6 Timing Signal Verify

Timing pulses (either primary or secondary) are received at LED9 (D28). The LED will flash according to the pulses received from the timing circuit. In the unlikely event that this LED is out, then total timing failure has occurred.

### 3.7.7 Flash Verified

Current from the Cathode side of the flashtube (FTC1, FTC2, and FTC3) are sent through the current sensing transformers T1, T2, and T3, on PCB #1. T1, T2, and T3 will send a pulse to the gate of the SCRs Q5, Q4, and Q7, and turn it on. Capacitors C12, C13, C11, C15, C16, and C17, via Q5, Q4, and Q7, will send voltage to LED1 (D9), LED3 (D10), and LED5 (D8). After each confirmed flash, LED1, LED 2, and LED3 will blink. Absence of a blinking LED signifies that the strobe beacon has ceased to flash.

**DUAL MEDIUM INTENSITY LED/STROBE  
MODEL E2/3DBSL CONTROLLER**

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3.7.8 Strobe Fail Test

Switch S1, when turned on, cuts off timing signal to the trigger circuit and extinguishes LED8 (D3). At this time the strobe alarm should be received at J3. The normal position of S1 is off (switch upward).

**3.8 LED DUAL BEACON**

It is a 120V AC 50/60 Hz LED Beacon energized by flasher PF-250, and works with current sensors M2, and M2A. While the LED red beacon fails, the current sensor will send 120V AC out to energize K8, to switch the system into white strobe nightmode (failsafe mode).

## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **4.0 TROUBLESHOOTING**

Much of the troubleshooting of this system will consist of correcting a "beacon out" situation. There may also be a failure mode where flashtube is still flashing, but at the wrong rate or the wrong intensity.

You must study and understand the safety messages and the theory of operation before attempting any service on this system. Servicing this system must be done by qualified personnel only.

### **4.1 TOOL REQUIREMENTS**

In order to be prepared to trouble shoot or repair this system, a minimum amount of tools and equipment will be required. A recommendation list includes:

- 1) 5/16 Flat Electrician's Screwdriver
- 1) #2 Phillips Screwdriver
- 1) Nut Driver or Socket Set
- 1) Multi meter - Analog or Digital 600V AC / 600V DC Minimum

### **4.2 DIAGNOSTIC EVALUATION**

The first step in trouble shooting of this system or performing annual maintenance will require the technician to open the controller door. With the power off to the controller, the technician should look over the controller circuit and repair or replace any apparent problems such as loose wire connections or corroded terminations. After the initial visual checks have been completed, restore power to the controller and pull out on the plunger of the cabinet safety switch (CSS) located at the lower right edge of the enclosure. Observe at this time the LEDs located on PCB #1 and PCB #2. Determine, by observation of these LED indicators, if the controller is performing to normal operation.

LEDs on PCB #1 are numbered from top to bottom, 1-9. LEDs on PCB #2 are numbered from top to bottom D14 - D16. (See Drawings H40-301, and H01-301.)



## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

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### 4.3 TROUBLESHOOTING ASSISTANCE

#### 4.3.1 Flash Verify LED - Out

4.3.1.1 Observe high voltage LED (D14, D15, and D16) on the same beacon circuit to determine if it is available. If the LED is dim, or out completely, then check the high voltage capacitor bank (C103 - C109, C111 – C117, and C119 – C125, day, C102, C118, and C110 night) for a short. If no capacitor is found to be shorted, check the resonant capacitor (C101, and C126) for a short. If the resonant capacitor is okay, replace PCB #2. If the LED is at full illumination, go to the next step.

4.3.1.2 Check the status of trigger LED6. If LED is dim or off, check fuse F2. If blown, replace with exact type of fuse. If the fuse blows again, check transformer T1. Replace as necessary. If LED is okay, go to the next step.

4.3.1.3 If steps 4.3.1.1, and 4.3.1.2 check out okay, re-lamp the beacon.

#### 4.3.2 Control Power on LED - Out

Check interlock circuits for an open circuit. If open, make the necessary repairs. If okay, check fuse F3. Replace if bad.

#### 4.3.3 Primary Timing LED - Out

Observe the status of the timing LED8. If the LED is dim or out completely, check LED9, if dim or out, replace PCB #1. If one or both are lit, you should have timing.

#### 4.3.4 False or Nonexistent LED Beacon Alarms (SF)

4.3.4.1 If alarm trips when the system appears to be working normally or fails to show an alarm when there is an obvious failure, check PCB #1, P2-ST for 120V AC output. If voltage is okay, go to the next step.

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

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4.3.4.2 Check relay K11 coils for an open condition. Normal resistance should be around 2K ohm. If coil is open, replace relay.

4.3.4.3 The time delay between an actual failure and the point where the relay trips is pre-set at the factory or about eight (8) seconds. This delay period can be tested by throwing "on" (*upward*) switch number S1 (on PCB #1). After testing return switch S1 to its normal (*downward*) position.

### 4.3.5 LED Beacon Flasher Failure (BB)

In case a failure occurs in the red beacon portion, either the LED beacon or the flasher fails. The system will operate in failsafe mode, and have beacon fail alarm at the J3 plug. Pin #14 is failsafe common, Pin #15 is closed, and Pin #13 is open.

To troubleshoot the red beacon portion:

1. Turn power off at circuit breaker to reset light system.
2. Pull Relay K8 out of socket, and set SW3 to nightmode upward position.
3. Then turn power on at circuit breaker. Observe the LED beacon.  
**IF:** Beacon steady burns (LED on Module will indicate flasher operation only) – replace M3 (Flasher)  
**IF:** No light – check B1. If B1 is good, replace the LED red beacon.

### 4.3.6 No LED Beacon Operation

4.3.6.1 Check if switch SW3 is on. If switch is off, turn switch to the on position (*upward*). Reset the circuit breaker at the service panel. If okay, go to the next step.

4.3.6.2 Check M3 – LDB for 120V AC. If 120V AC doesn't show up, check Relay K3; it should be energized. If okay, go to the next step.

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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- 4.3.6.3 Check M3 – BA for 120V AC. If 120V AC is not present, replace M3. If okay, check fuses F5 and F6.

***Note: Once the unit fail-safes, you will need to reset the breaker at the panel in order to release the latched relay in this circuit anytime a failure has been detected. This is an important fact to remember when trouble shooting this system.***

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **5.0 MAINTENANCE GUIDE**

#### **\*\*WARNING - HIGH - VOLTAGE\*\***

**THIS SYSTEM OPERATES AT HIGH VOLTAGE LEVELS THAT COULD BE LETHAL TO SERVICE PERSONNEL. ALL INSTALLATION AND MAINTENANCE WORK SHOULD BE DONE BY QUALIFIED SERVICE PERSONNEL. READ AND UNDERSTAND THE THEORY OF OPERATION AND ITS SAFETY MESSAGES BEFORE ATTEMPTING INSTALLATION OF THIS SYSTEM. DO NOT ATTEMPT TO DEFEAT THE INTERNAL SAFETY DEVICES.**

**Tools Required:** #2 Phillips Screwdriver  
3/16 Flat Blade Screwdriver

### **5.1 FLASHTUBE REPLACEMENT**

The only required maintenance needed to be performed is the replacement of the flashtubes every four (4) years. By following these instructions, maximum safety and performance can be achieved.

5.1.1 Loosen the single quick open bolt located on upper hinge assembly.

5.1.2 Open the lens and tilt it back.

**ALWAYS WAIT AT LEAST 30 SECONDS AFTER OPENING THE BEACON BEFORE STARTING ANY WORK ON THE BEACON.**

5.1.3 Loosen the three (3) socket screws with a #2 Phillips screwdriver to remove lamp.

5.1.4 Install the new daymode flashtube making sure that the pins are aligned with the socket. Make sure tube is flush on the socket.

5.1.5 Tighten the socket screws snug, then 1/4 turn more.

5.1.5 Close the upper hinge assembly and latch securely.

**DUAL MEDIUM INTENSITY LED/STROBE  
MODEL E2/3DBSL CONTROLLER**

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**5.2 RED OBSTRUCTION LIGHTING**

The only required maintenance needed to be performed is replacement of the lamps in the L-810 fixture. Lamps should be replaced after being operated for not more than 75% of the rated life, or immediately upon failure, as per FAA Advisory Circular 70/7460-1K. By following these instructions, maximum safety and performance can be achieved.

**Tools Required:** None

**5.2.1 LED LAMP REPLACEMENT (Sidelights)**

**NO MAINTENANCE IS NEEDED OR REQUIRED OTHER THAN REPLACEMENT AS NECESSARY.**

**5.3 PHOTOCELL**

The photocell is a sealed unit. No maintenance is needed nor required other than replacement as necessary.

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

### **6.0 MAJOR COMPONENTS LIST**

SCHEMATIC TAG #	DESCRIPTION	PART NUMBER
BSS1, BSS2, BSS3	BEACON SAFETY SWITCH	STJ02003
C126	4 uf 660V AC CAP	STB99005
C101, C102, C110, C118	3 uf 660 KV CAP CSI	STB99008CSI
C103 - C109 C111 – C117 C119 – C125	40 uf 1KV CAP	STB99006
CSS	CABINET SAFETY SWITCH	STJ02001
F1	10 amp FUSE	FNQ10
F2	1/8 amp FUSE	FLQ18
F3, F7	1 amp FUSE	KTK1
F4	20 amp FUSE	FNQ20
F6	3 amp FUSE	KTK3
FT1, FT2, FT3	DAYMODE FLASHTUBE	STFLSHTB8
K3	REDLIGHT/ STROBE POWER RELAY	STJ10006
K2	HV BLEEDER RELAY DPDT	STJ10006
K2A	HV BLEEDER RELAY 4PDT	PM17AY
K5A, K5B, K5C K9, K4, K1, K7	DPDT OCTAL RELAY	KRPA11AG120
K8, K10, K1A, K6	SPDT OCTAL RELAY	KRPA5AG120
K11	TIME DELAY RELAY	SPEC218
L1, L2, L3	INDUCTOR	INDCTR3001
L11, L22, L33	BURST CHOKE	100273
M2A	MID LED BEACONS CURRENT SENSOR	RM22JA31MRSP01
MOV2	METAL OXIDE VARISTOR	MOV524V15

25

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

### **6.0 MAJOR COMPONENTS LIST (continued)**

SCHEMATIC TAG #	DESCRIPTION	PART NUMBER
MOV1	SURGE SUPPRESSOR	SPM120(This replaces the DTK-120HW)
MOV 3, 4, 5	METAL OXIDE VARISTOR	V1000LA80A
P1, J1	15 POSITION PLUG	STT60021
J3	18 POSITION PLUG	STT60015
PCB #1	E-2/3DBSL CONTROL PCB	STH01258B
PCB #2	HIGH VOLTAGE RECTIFIER PCB	STH02258A
PCB #3	RELAY PCB w/ALARM LOCKOUT ELIMINATION MODIFICATION	STH03301A
PHOTOCELL	120 - 240V AC PHOTOCELL	6390-FAA2 (This replaces the P2455L Photocell)
R31, R33, R35	150 ohm 100W	STA8018
R32, R34, R36	35K ohm 20W	STA08015
R37, R38, R39	2.4 MEG 2W	ST08010
SW3	SPDT 15 AMP SWITH	STJ01004
T2	ISOLATION TRANSFORMER	STC05009
T3	FERRORESONANT TRANSFORMER	STC30019
T1	FERRORESONANT TRANSFORMER	STC30018
R38	AUXILIARY LOAD RESISTOR	B20J1K2
T4, T5, T6	TRIGGER TRANSFORMER	STC05005
TB1	15 PART TERM BLK	TERMBLK-15
M1, M2	LED SIDELIGHT AND TOP LED BEACON CURRENT SENSORS	RM22JA31MRSP01
TB3	SINGLE POLE TERMINAL	8WA1204
TB2	12 PART TERM BLK	TERMBLK 141-12

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

### **6.0 MAJOR COMPONENTS LIST (continued)**

SCHEMATIC TAG #	DESCRIPTION	PART NUMBER
TLS	THERMAL LIMITING SWITCH/210	STJ10008
M3	FLASHER	PF-250 (This replaces the FS15530T Module)
J2	6 POSITION PLUG	STT60017
M4	TIMER	TS14130
F5	2 amp FUSE	KTK2
	FLASHTUBE SOCKET	100319
	HINGE GASKET	STBEAGSKT
	LENS GASKET	STBEAGSKT2
	CLEAR DUAL BEACON LENS	STDBCLENS
	STROBE BEACON CABLE	STROBCABLE-3
	SIDELIGHT CABLE	STCABLEOB
	LED DUAL BEACON	STLDBEAON2A
	DUAL BEACON UPPER TERMINAL BLOCK KIT	DBTERMBLK8KIT
	DUAL BEACON LOWER TERMINAL BLOCK KIT	DBTERMBLK10KIT
	STLDBEAON2A, BOTTOM CLEAR LENS	STLDBCTUBE-2
	STROBE CABLE TIE	STCABLTIE
	STLDBEAON2A HATCH LATCH ASSEMBLY	STLDBHATPLT
	SINGLE EYE LACE MESH .50 - .62	CABLEGRIP1



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### **6.0 MAJOR COMPONENTS LIST (continued)**

<b>SCHEMATIC TAG #</b>	<b>DESCRIPTION</b>	<b>PART NUMBER</b>
	SINGLE EYE LACE MESH .63 - .74	CABLEGRIP3
	LED SIDELIGHT 120 – 240V AC RETROFIT KIT ASSEMBLY	LED120-2RK

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **7.0 SUGGESTED SPARE PARTS LIST**

QTY	DESCRIPTION	PART NUMBER
4	1 amp FUSE	KTK1
2	10 amp FUSE	FNQ10
2	20 amp FUSE	FNQ20
1	E2/3DBSL PCB #1	STH01258B
1	120 - 240V AC PHOTOCELL	6390-FAA2 (This replaces the P2455L Photocell)
2	3 amp FUSE	KTK3
2	1/8 amp FUSE	FLQ18
1	40 uf CAP	STB99006
1	DPDT RELAY	KRPA11AG120
1	SPDT RELAY	KRPA5AG120
1	STROBE FLASHTUBE	STFLSHTB8
2	2 amp FUSE	KTK2

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **Warranty & Return Policy**

**TWR Lighting<sup>®</sup>, Inc. (“TWR<sup>®</sup>”)** warrants its products (other than “LED Product”) against defects in design, material (excluding incandescent bulbs) and workmanship for a period ending on the earlier of two (2) years from the date of shipment or one (1) year from the date of installation.

**TWR Lighting<sup>®</sup>, Inc. (“TWR<sup>®</sup>”)** warrants its “LED Product” against defects in design, material and workmanship for a period of five (5) years from the date of shipment. TWR<sup>®</sup>, at its sole option, will, itself, or through others, repair, replace or refund the purchase price paid for “LED Product” that TWR<sup>®</sup> verifies as being inoperable due to original design, material, or workmanship. All warranty replacement “LED Product” is warranted only for the remainder of the original warranty of the “LED Product” replaced. Replacement “LED Product” will be equivalent in function, but not necessarily identical, to the replaced “LED Product.”

**TWR Lighting<sup>®</sup>, Inc. (“TWR<sup>®</sup>”)** warrants its “LED Product” against light degradation for a period of five (5) years from the date of installation. TWR<sup>®</sup>, at its sole option, will, itself, or through others, repair, replace, or refund the purchase price paid for “LED Product” that TWR<sup>®</sup> verifies as failing to meet 75% of the minimum intensity requirements as defined in the FAA Advisory Circular 150/5345-43G dated 09/26/12. All warranty replacement “LED Product” is warranted only for the remainder of the original warranty of the “LED Product” replaced. Replacement “LED Product” will be equivalent in function, but not necessarily identical, to the replaced “LED Product.”

**Replacement parts (other than “LED Product”) are warranted for 90 days from the date of shipment.**

Conditions not covered by this Warranty, or which might **void** this Warranty are as follows:

- x Improper Installation or Operation
- x Misuse
- x Abuse
- x Unauthorized or Improper Repair or Alteration
- x Accident or Negligence in Use, Storage, Transportation, or Handling
- x Any Acts of God or Nature
- x **Non-OEM Parts**

**The use of Non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.**

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **Warranty & Return Policy** (continued)

**Field Service** – Labor, Travel, and Tower Climb are not covered under warranty. Customer shall be obligated to pay for all incurred charges. An extensive network of certified and insured Service Representatives is available if requested.

**Repair, Replacement or Product Return RMA Terms** – You must first contact our Customer Service Department at **713-973-6905** to acquire a Return Merchandise Authorization (RMA) number in order to return the product(s). Please have the following information available when requesting an RMA number:

- x The contact name and phone number of the tower owner or
- x The contact name and phone number of the contractor
- x The site name and number
- x The part number(s)
- x The serial number(s) (if any)
- x A description of the problem
- x The billing information
- x The Ship To address

**This RMA number must be clearly visible on the outside of the box.** If the RMA number is not clearly labeled on the outside of the box, your shipment will be refused. Please ensure the material you are returning is packaged carefully. **The warranty is null and void if the product(s) are damaged in the return shipment.**

**All RMAs must be received by TWR LIGHTING<sup>®</sup>, INC., 10810 W. LITTLE YORK RD. #130, HOUSTON, TX 77041-4051, within 30 days of issuance.**

Upon full compliance with the Return Terms, TWR<sup>®</sup> will replace, repair and return, or credit product(s) returned by the customer. It is TWR<sup>®</sup>'s sole discretion to determine the disposition of the returned item(s).

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## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

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### **Warranty & Return Policy** (continued)

**RMA Replacements** – Replacement part(s) will be shipped and billed to the customer for product(s) considered as Warranty, pending return of defective product(s). When available, a certified reconditioned part is shipped as warranty replacement with a Return Merchandise Authorization (RMA) number attached. Upon receipt of returned product(s), inspection, testing, and evaluation will be performed to determine the cause of defect. The customer is then notified of the determination of the testing.

- x Product(s) that is deemed defective and/or unrepairable and covered under warranty - a credit will be issued to the customer's account.
- x Product(s) found to have no defect will be subject to a **\$75.00 per hour testing charge (1 hour minimum), which will be invoiced to the customer.** At this time the customer may decide to have the tested part(s) returned and is responsible for the return charges.
- x Product(s) under warranty, which the customer does not wish returned, the customer will be issued a credit against the replacement invoice.

**RMA Repair & Return** – A Return Merchandise Authorization (RMA) will be issued for all part(s) returned to TWR<sup>®</sup> for repair. Upon receipt of returned product(s), inspection, testing, and evaluation will be performed to determine the cause of defect. The customer is then notified of the determination of the testing. If the returned part(s) is deemed unrepairable, or the returned part(s) is found to have no defect, the customer will be subject to a **\$75.00 per hour testing charge (1 hour minimum), which will be invoiced to the customer.** Should the returned parts be determined to be repairable, a written estimated cost of repair will be sent to the customer for their written approval prior to any work being performed. In order to have the tested part(s) repaired and/or returned, the customer must issue a purchase order and is responsible for the return shipping charges.

**RMA Return to Stock** – Any product order that is returned to TWR<sup>®</sup> for part(s) ordered incorrectly or found to be unneeded upon receipt by the customer, the customer may be required to pay a minimum **20% restocking fee.** Product returned for credit must be returned within 60-days of original purchase, be in new and resalable condition, and in original packaging. Once the product is received by TWR it's condition will be evaluated and a credit will be issued only once it is determined that the RMA Return Terms have been met.

**Credits** – Credits are issued once it is determined that all of the Warranty and Return Terms are met. All credits are processed on Fridays. In the event a Friday falls on a Holiday, the credit will be issued on the following Friday.

# **TWR Lighting, Inc.** **MARK**<sup>®</sup>

*Enlightened Technology*<sup>®</sup>

## **DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER**

---

### **Warranty & Return Policy** (continued)

**Freight** – All warranty replacement part(s) will be shipped via ground delivery and paid for by TWR<sup>®</sup>. Delivery other than ground is the responsibility of the customer.

REMEDIES UNDER THIS WARRANTY ARE LIMITED TO PROVISIONS OF REPLACEMENT PARTS AND REPAIRS AS SPECIFICALLY PROVIDED. IN NO EVENT SHALL TWR<sup>®</sup> BE LIABLE FOR ANY OTHER LOSSES, DAMAGES, COSTS, OR EXPENSES INCURRED BY THE CUSTOMER, INCLUDING, BUT NOT LIMITED TO, LOSS FROM FAILURE OF THE PRODUCT(S) TO OPERATE FOR ANY TIME, AND ALL OTHER DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING ALL PERSONAL INJURY OR PROPERTY DAMAGE DUE TO ALLEGED NEGLIGENCE, OR ANY OTHER LEGAL THEORY WHATSOEVER. THIS WARRANTY IS MADE BY TWR<sup>®</sup> EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED. WITHOUT LIMITING THE GENERALITY OF THE FORGOING, TWR<sup>®</sup> MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS OF THE PRODUCT(S) FOR ANY PARTICULAR PURPOSE. TWR<sup>®</sup> EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES.

# **TWR Lighting, Inc.** HARK<sup>®</sup>

*Enlightened Technology<sup>®</sup>*

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

---

---

### RETURN MERCHANDISE AUTHORIZATION (RMA) FORM

RMA#: \_\_\_\_\_ DATE: \_\_\_\_\_

CUSTOMER: \_\_\_\_\_

---

CONTACT: \_\_\_\_\_ PHONE NO.: \_\_\_\_\_

ITEM DESCRIPTION (PART NO.): \_\_\_\_\_

---

MODEL NO.: \_\_\_\_\_ SERIAL NO.: \_\_\_\_\_

ORIGINAL TWR INVOICE NO.: \_\_\_\_\_ DATED: \_\_\_\_\_

DESCRIPTION OF PROBLEM: \_\_\_\_\_

---

---

---

SIGNED: \_\_\_\_\_ DATE NEEDED: \_\_\_\_\_

RETURN ADDRESS: \_\_\_\_\_

---

PLEASE RETURN PRODUCT TO: 10810 W. LITTLE YORK RD., #130 HOUSTON, TX 77041-4051

# **TWR Lighting, Inc.** HARK<sup>®</sup>

*Enlightened Technology<sup>®</sup>*

## DUAL MEDIUM INTENSITY LED/STROBE MODEL E2/3DBSL CONTROLLER

---

---

### RETURN MERCHANDISE AUTHORIZATION (RMA) FORM

RMA#: \_\_\_\_\_ DATE: \_\_\_\_\_

CUSTOMER: \_\_\_\_\_

---

CONTACT: \_\_\_\_\_ PHONE NO.: \_\_\_\_\_

ITEM DESCRIPTION (PART NO.): \_\_\_\_\_

---

MODEL NO.: \_\_\_\_\_ SERIAL NO.: \_\_\_\_\_

ORIGINAL TWR INVOICE NO.: \_\_\_\_\_ DATED: \_\_\_\_\_

DESCRIPTION OF PROBLEM: \_\_\_\_\_

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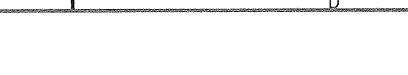
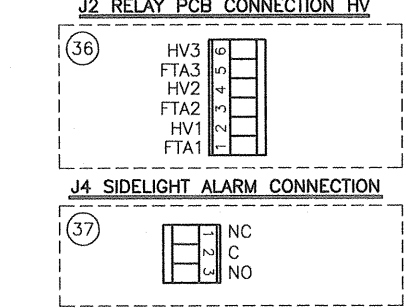
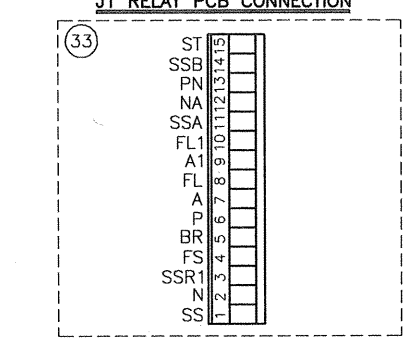
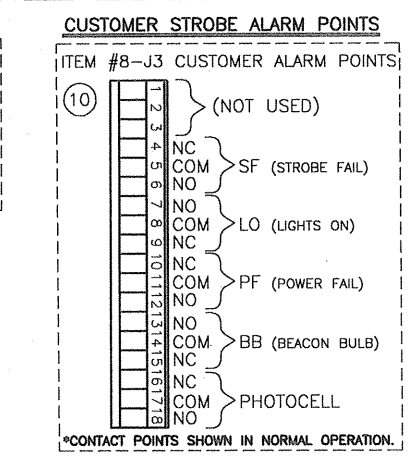
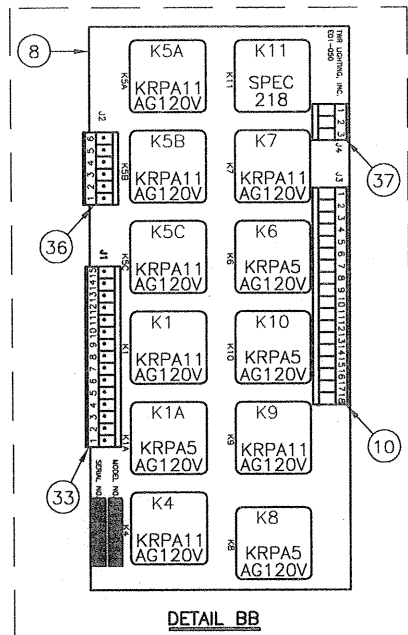
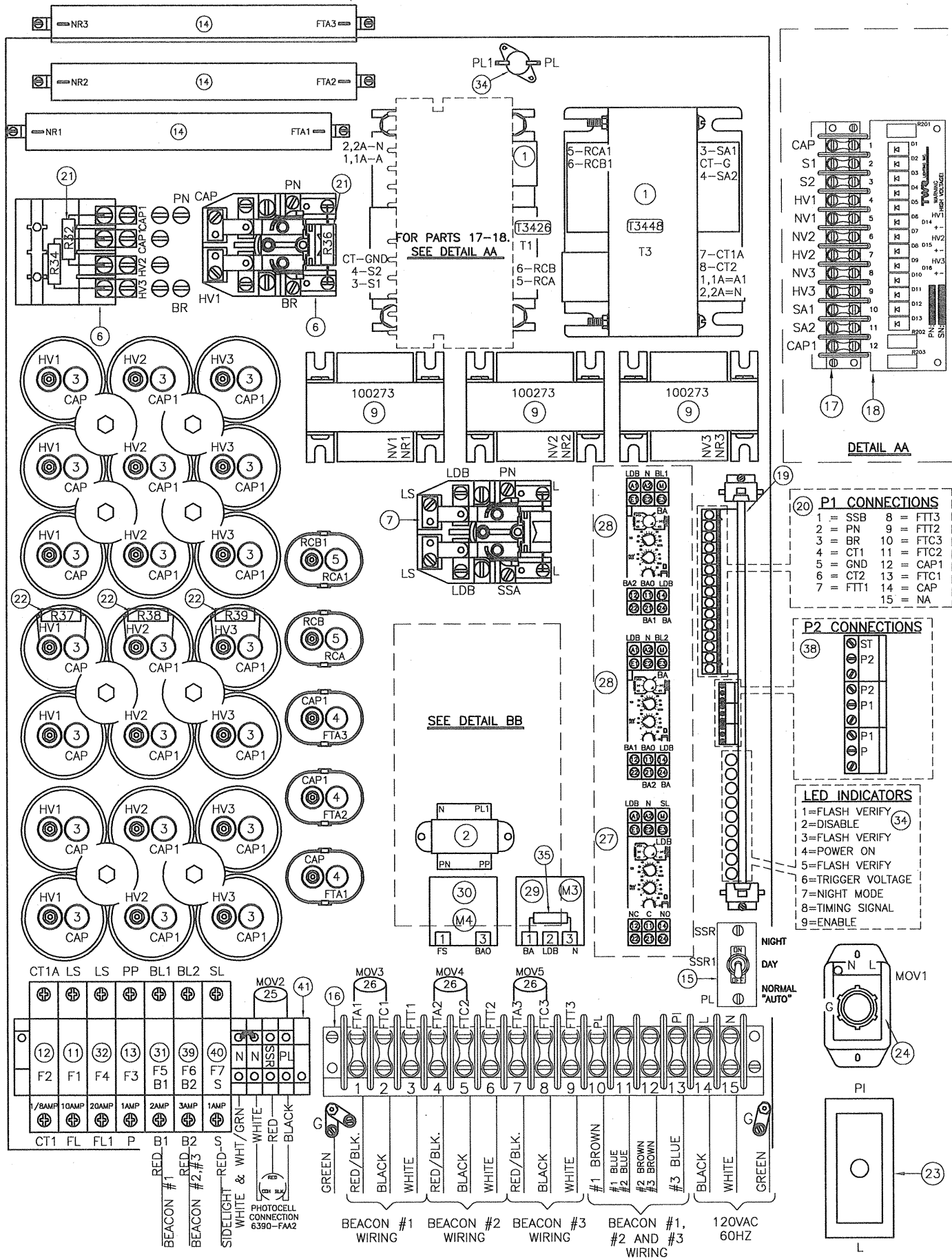
SIGNED: \_\_\_\_\_ DATE NEEDED: \_\_\_\_\_

RETURN ADDRESS: \_\_\_\_\_

---

PLEASE RETURN PRODUCT TO: 10810 W. LITTLE YORK RD., #130 HOUSTON, TX 77041-4051





NOTES:

- WIRES ARE CONNECTED LETTER TO LETTER. (EXAMPLE: N TO N TO N)
- THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE. TWR LIGHTING, INC. DOCUMENTATION SUPERSEDES THIS DRAWING AND SHOULD BE REVIEWED PRIOR TO INSTALLATION OF THIS SYSTEM.

ITEM NO.	SCH. TAG NO.	DESCRIPTION
1	T1	FERRORESONANT TRANSFORMER STC30018
	T3	FERRORESONANT TRANSFORMER STC30019
2	T2	ISOLATION TRANSFORMER STC05009
3	C103-C109, C111-C117, C118-C125	DAY CAPACITORS 40uf @ 1.1KV STB99006
4	C102, C110, C118	NIGHT CAPACITOR 3uf @ 660VAC STB99008CSI
5	C126	RESONANT CAPACITOR 4uf, STB99005
	C101	RESONANT CAPACITOR 3uf, STB99008CSI
6	K2A	BLEEDER RELAY PM17AY
	K2	BLEEDER RELAY PRD11AGO, STJ10006
7	K3	REDLIGHT/STROBE POWER RELAY PRD11AGO, STJ10006
8	PCB3	RELAY PCB STH03-301A
	K1	POWER RELAY
	K1A	POWER RELAY
	K4	PHOTOCELL RELAY
	K5A	NIGHT/DAY INTENSITY RELAY #1
	K5B	NIGHT/DAY INTENSITY RELAY #2
	K5C	NIGHT/DAY INTENSITY RELAY #3
	K6	POWER ALARM
	K7	LIGHT ON RELAY
	K8	TRANSFER RELAY
	K9	FAIL SAFE RELAY
	K10	LED BEACON BURNOUT
	K11	STROBE FAIL RELAY
9	L11, L21, L31	BURST CHOKE. 100273
10	J3	CUSTOMER ALARM POINTS STT60015
11	F1	10A FUSE (FNQ 10)
12	F2	1/8 AMP FUSE (FLQ 18)
13	F3	1 AMP FUSE (KTK 1)
14	R31, R33, R35	150 OHM 100W RESISTOR STA08018
15	SW3	PHOTOCELL BYPASS SWITCH STJ01004
16	TB1	TERMINAL BLOCK 1 TERMBLK 15
17	TB2	TERMINAL BLOCK 2 TERMBLK 141-12
18	PCB2	HIGH VOLTAGE RECTIFIER PCB STH02-258A
19	PCB1	CONTROL PCB STH01-258B
20	P1	PCB CONNECTION STT60021
21	R32, R34, R36	BLEEDER RESISTOR 35K 20W STA08015
22	R37, R38, R39	AUXILIARY BLEEDER RESISTOR 2.4M 2W STA08010
23	CSS	CABINET SAFETY SWITCH STJ02001
24	MOV1	LINE MOV SPM-120
25	MOV2	PHOTOCELL MOV 524V15
26	MOV3, 4, 5	HIGH VOLTAGE OUTPUT MOV V1000LA80A
27	M1	SIDELIGHT CURRENT SENSING MODULE RM22JA31MRSP01
28	M2, M2A	BEACON CURRENT SENSING MODULES RM22JA31MRSP01
29	M3	FLASHER PF-250
30	M4	TIMER TS14130
31	F5	2 AMP FUSE (KTK 2)
32	F4	20 AMP FUSE (FNQ 20)
33	P11	RELAY PCB CONNECTION STT60021
34	TLS	THERMAL LIMITING SWITCH STJ10008
35	R38	AUXILIARY LOAD RESISTOR 1.2K20W STA40007
36	P12	HV PCB CONNECTION STT60017
37	J4	SIDELIGHT ALARM CONNECTION
38	P2	STROBE ALARM CONNECTION
39	F6	3 AMP FUSE (KTK3)
40	F7	1 AMP FUSE (KTK1)
41	TB3	RED LIGHTS AND PHOTOCELL TERMINAL

**E2/3DBSL CONTROLLER**  
**CHASSIS LAYOUT**

PROD DEPT: *[Signature]*  
SERV DEPT: *[Signature]*  
ENGINEER: *[Signature]*

**TWR Lighting, Inc.**  
*Enlightened Technology* **WARK**

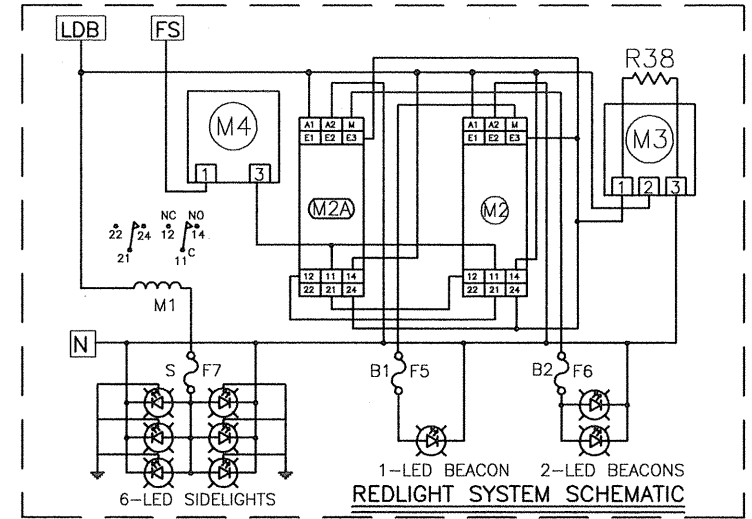
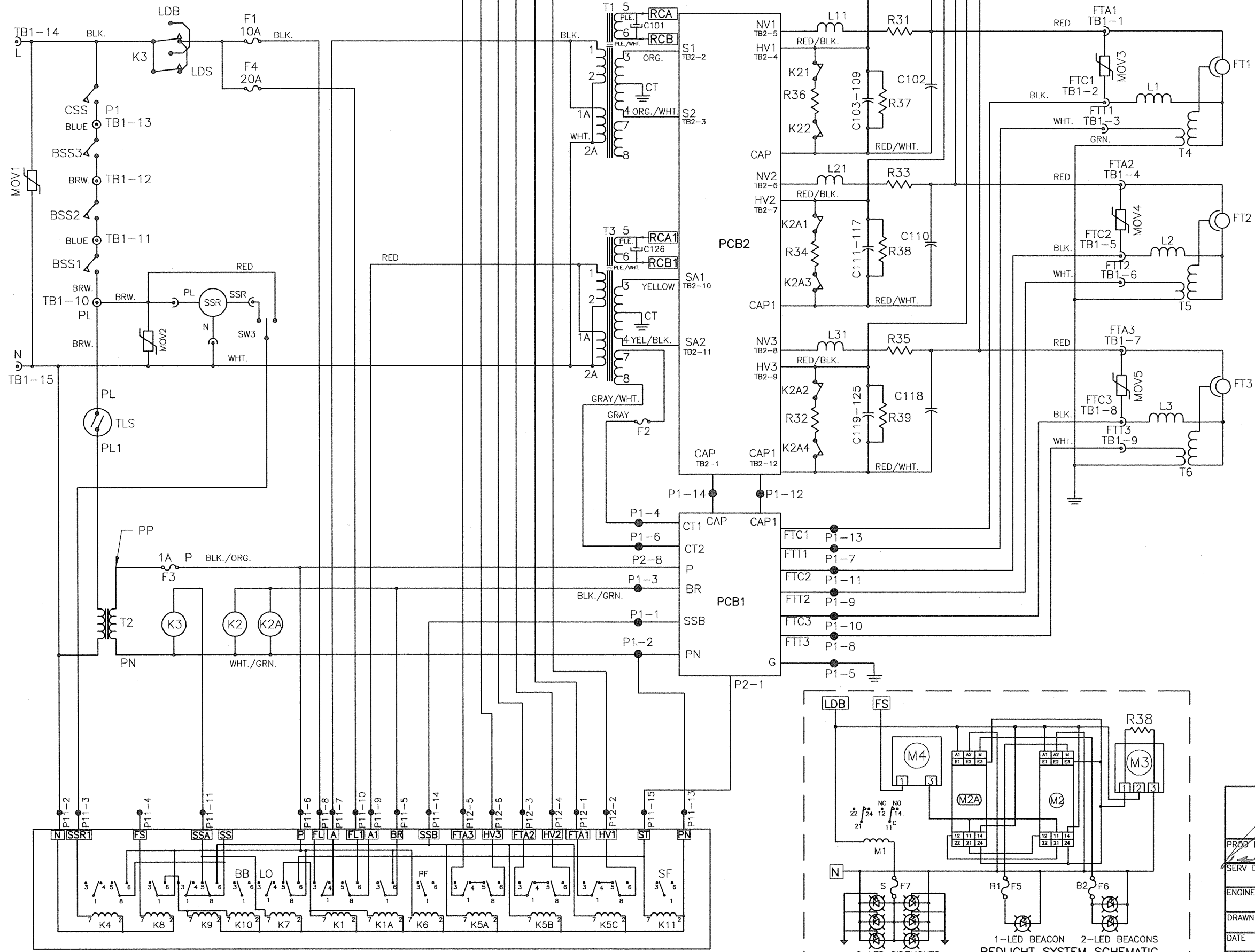
DRAWN BY: G.D. SEBEK  
DATE: 04/05/04  
SCALE: N.T.S.

SHEET SIZE: B  
SHEET QTY: 1 OF 1  
DWG. NO.: H40-301

01/19/2017	U	CURRENT SENSOR
DATE:	LTR.	REVISION

The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.

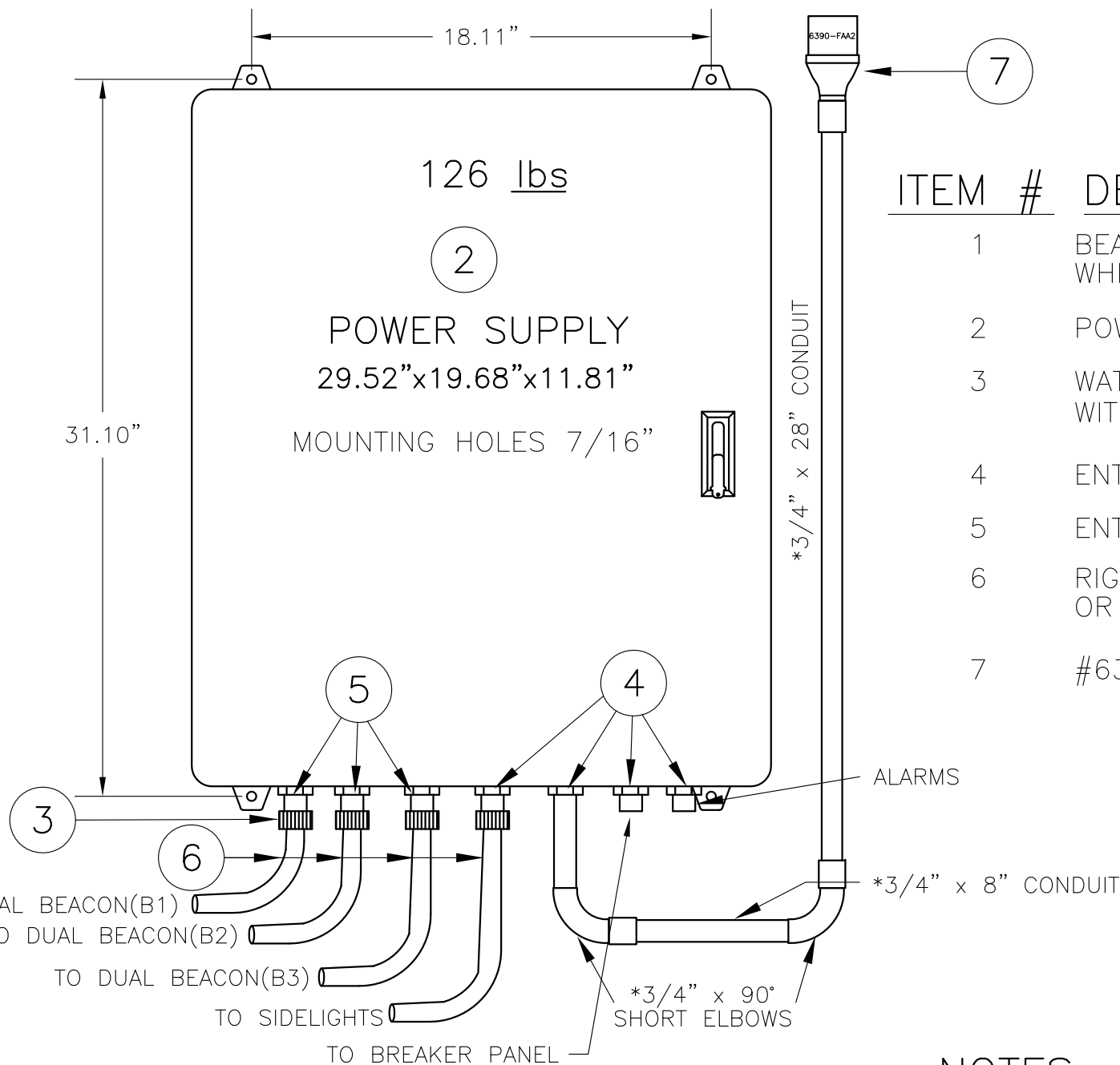
NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.



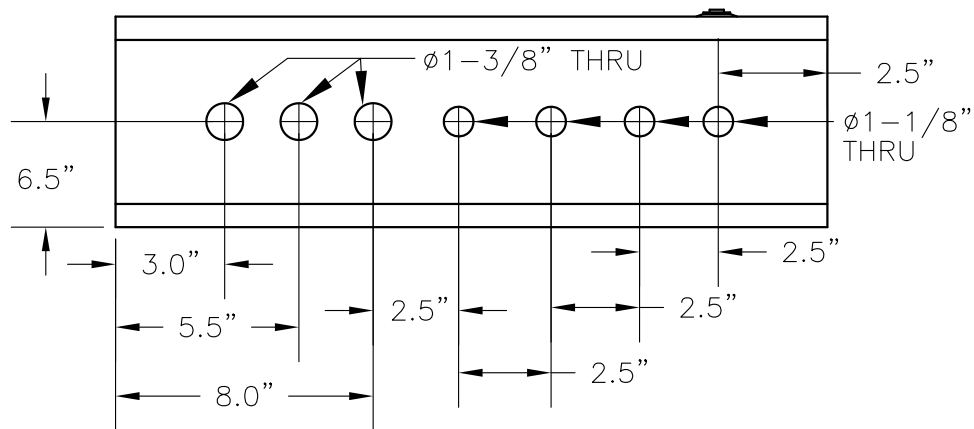
<b>E2/3DBSL SCHEMATIC LAYOUT</b>						
PROD. DEPT.	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology</i> <b>MARK</b>					
SERV. DEPT.						
ENGINEER	DRAWN BY	E.A. SALAZAR	SHEET SIZE	B	SHEET QTY.	1 OF 1
	DATE	03/08/04	SCALE	N.T.S.	DWG. NO.	M01-301

01/30/17 (K) CURRENT SENSOR

The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.  
 NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.

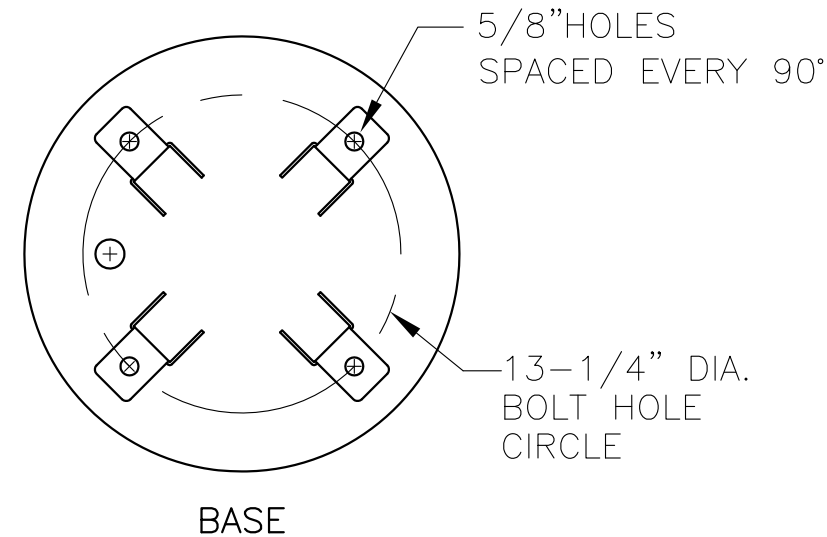
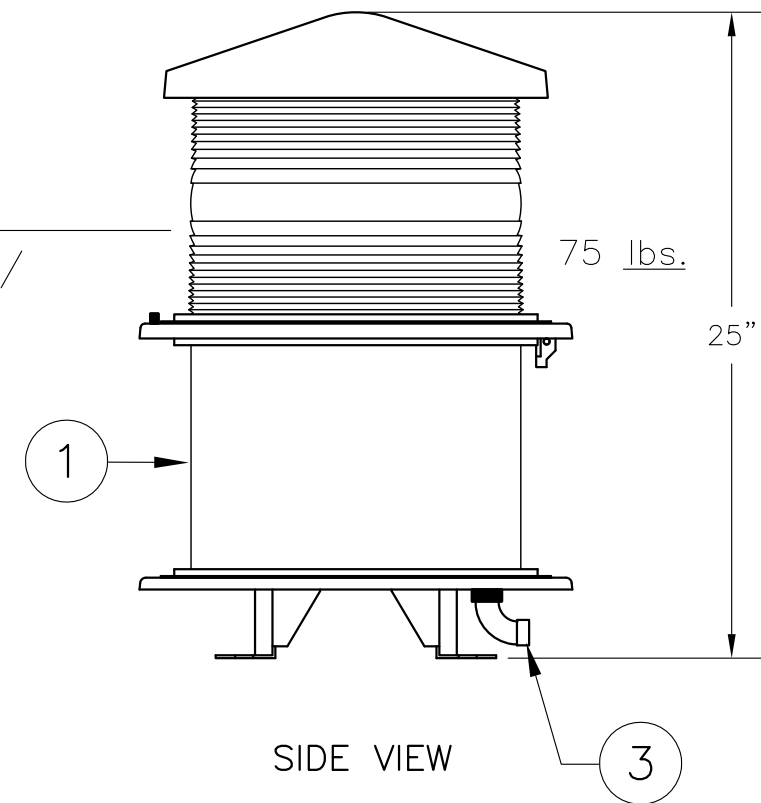


\* = ITEMS NOT INCLUDED BUT ARE AVAILABLE UPON REQUEST.



**ITEM # DESCRIPTION**

- 1 BEACON L-864/L865 DUAL RED LED / WHITE STROBE.
- 2 POWER SUPPLY E2/3DBSL
- 3 WATER TIGHT CABLE CONNECTOR WITH SEALING GLAND.
- 4 ENTRANCE HUB 3/4"
- 5 ENTRANCE HUB 1"
- 6 RIGID GALVANIZED CONDUIT OR STROBE CABLE.
- 7 #6390-FAA2 PHOTOCCELL



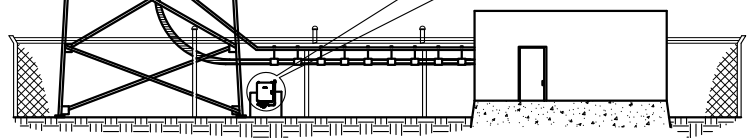
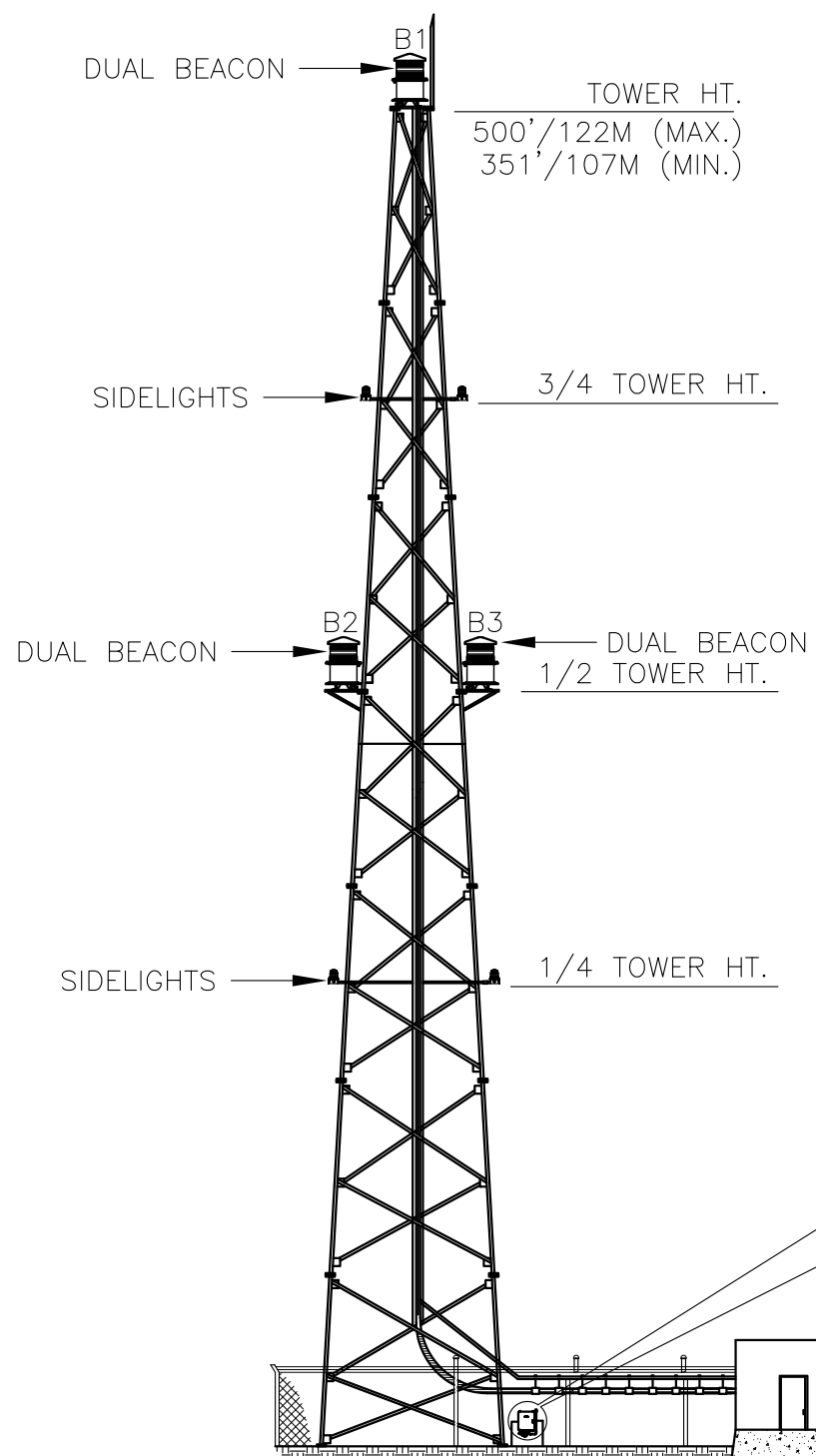
**NOTES:**

- A POWER SUPPLY IS NORMALLY MOUNTED AT GROUND LEVEL ON TOWER. IT CAN ALSO BE MOUNTED INDOORS. RECOMMENDED MOUNTING HEIGHT IS 48" TO BOTTOM OF THE ENCLOSURE FOR EASE OF MAINTENANCE.
- B MOUNT BEACON HINGES SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.

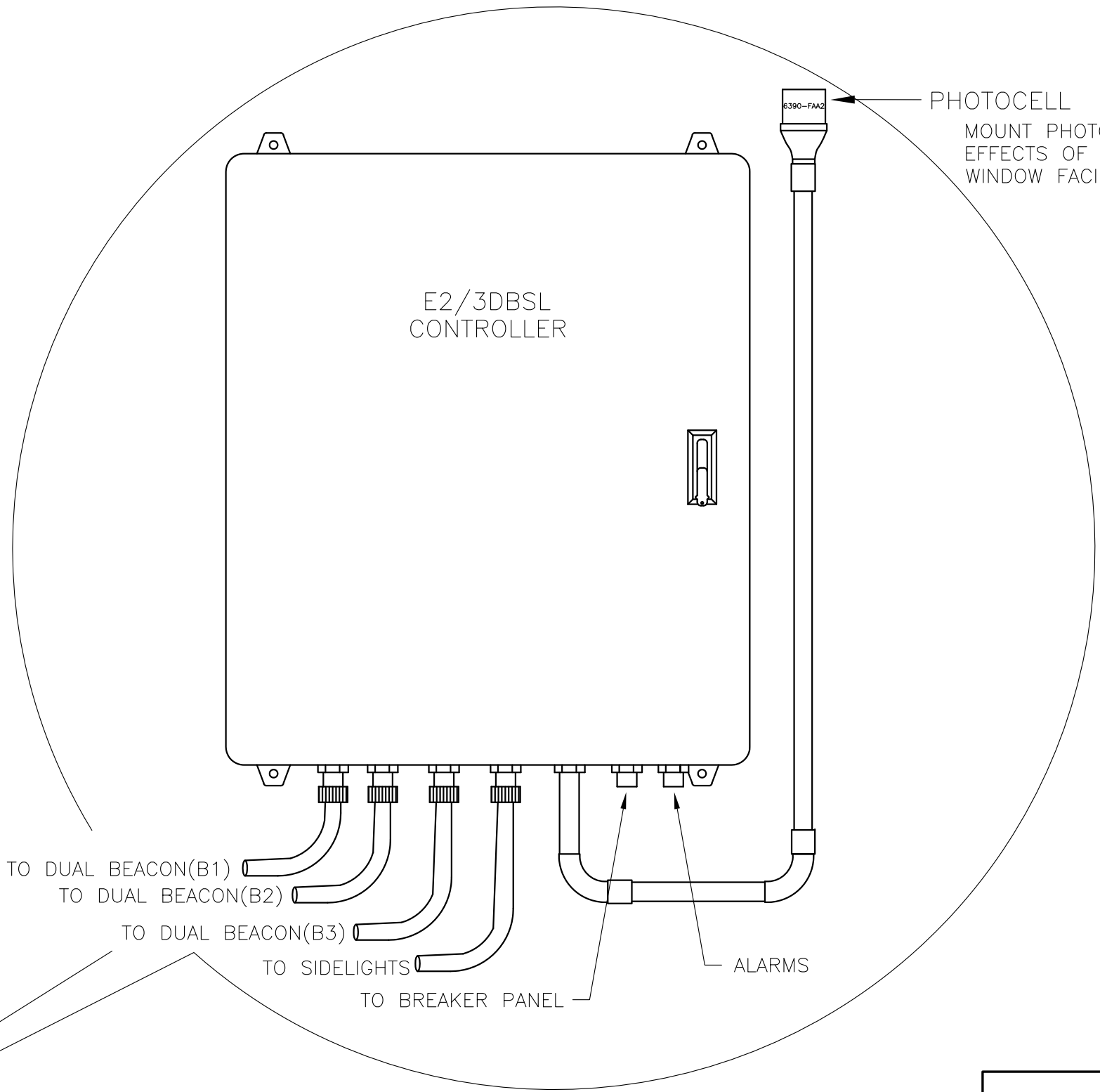
<b>HOUSING DETAILS E2/3DBSL</b>			
<b>L-864/L-865 RED/WHITE BEACON</b>			
PROD DEPT	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology®</i>		
SERV DEPT			
ENGINEER			
DRAWN BY	G.D. SEBEK	SHEET SIZE	SHEET QTY.
DATE	07/26/04	SCALE	N.T.S.
		DWG. NO.	HDO-301

11/17/2014	(B)	UPDATED DRILL HOLES
DATE:	LTR.	REVISION

The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.  
NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.



TYPICAL SITE LAYOUT



PHOTOCELL  
MOUNT PHOTOCELL OUTSIDE AWAY FROM EFFECTS OF EXTERIOR LIGHT WITH WINDOW FACING NORTH.

- NOTES:
1. THIS CONTROLLER CAN BE MOUNTED INDOOR OR OUTDOOR.
  2. IT IS HIGHLY RECOMMENDED TO MOUNT A LIGHTING ROD AT THE TOP LEVEL.
  3. FOR MORE DETAILS REFER TO DRAWINGS HD0-301 (CONTROLLER INSTALLATION), 603 (LIGHT KIT CABLE RUN).

<b>E2/3DBSL INSTALLATION GUIDELINE</b>			
PROD DEPT	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology®</i>		
SERV DEPT			
ENGINEER			
DRAWN BY G.D. SEBEK	SHEET SIZE B	SHEET QTY. 1 OF 1	
DATE 07/26/04	SCALE N.T.S.	DWG. NO. INS-301	
<small>The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43. NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.</small>			

11/17/2014	(B)	UPDATED ENCLOSURE
DATE:	LTR.	REVISION

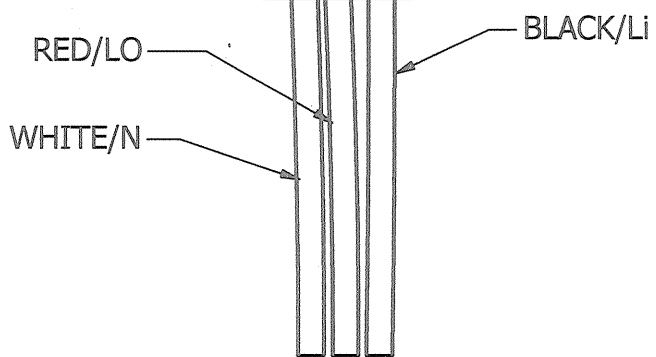
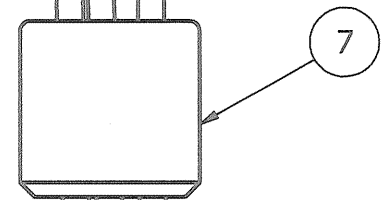
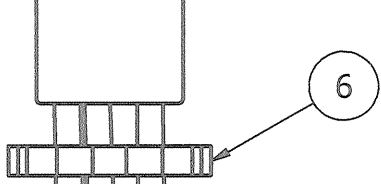
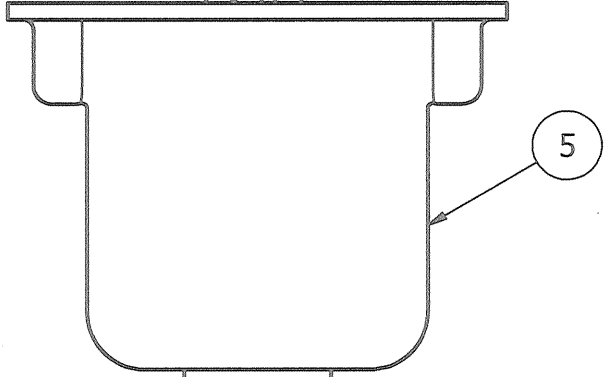
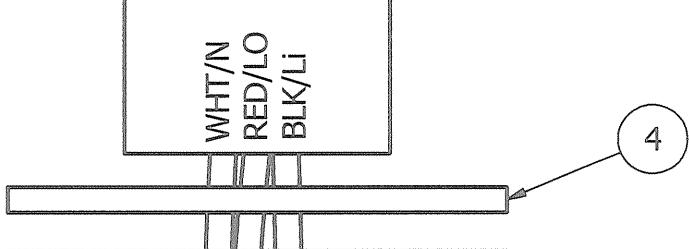
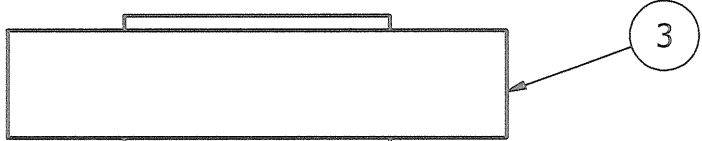
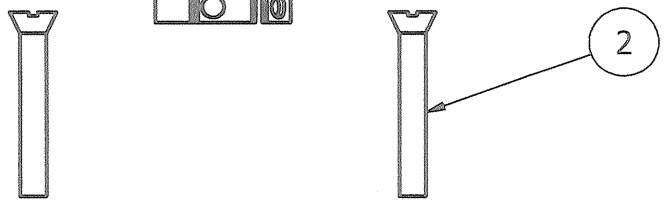
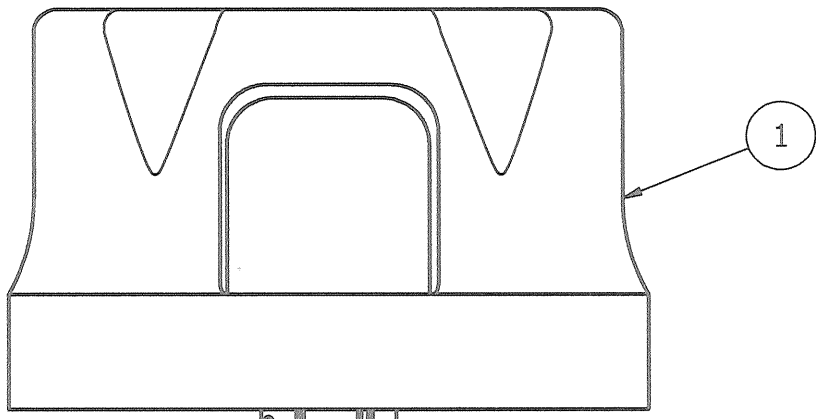
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3

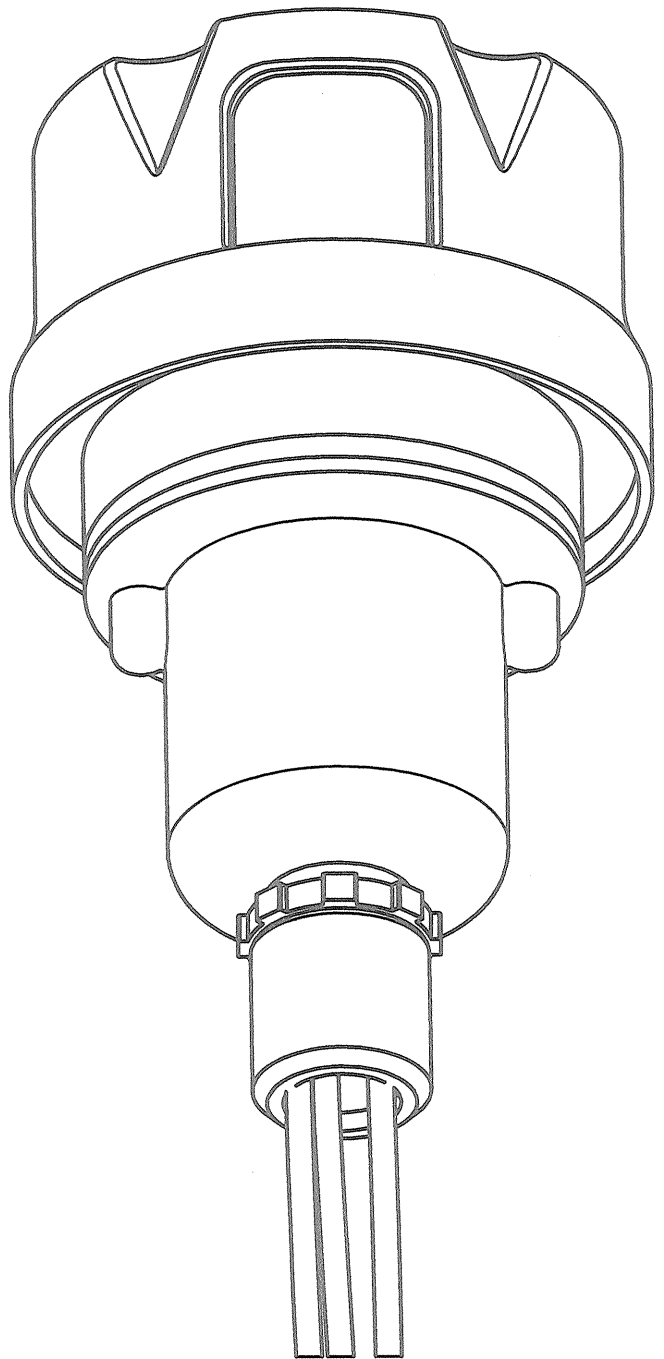
2

1

PARTS LIST		
ITEM	QTY	PART NUMBER
1	1	PHOTOCELL
2	2	6-32 x 1" SCREW
3	1	RECEPTACLE SOCKET
4	1	RECEPTACLE GASKET
5	1	RECEPTACLE HOUSING
6	1	1/2" CONDUIT LOCKNUT
7	1	3/4" TO 1/2" REDUCER



EXPLODED VIEW



ASSEMBLY

NOTES:

- 1. ITEM #7 CAN BE USED TO REDUCE 3/4" CONDUIT TO 1/2" CONDUIT AT THE HOUSING OR AT THE CONTROLLER ITSELF.
- 2. IF ADDITIONAL WIRE IS REQUIRED OVER THE FACTORY 20', USE THE FOLLOWING CHART.  
 21' TO 300' - 16 AWG TFFN  
 301' TO 500' - 14 AWG TFFN

PHOTOCELL HOUSING DETAIL

PROD. DEPT  
 SERV. DEPT  
 ENGINEER

**TWR Lighting, Inc. HARK**  
 Enlightened Technology®

DRAWN BY	vhernandez	SHEET SIZE	B	SHEET QTY.	1 OF 1
DATE	10/18/1995	SCALE	1/1	DWG. NO.	100239i

DATE	REV	AUTHOR	DESCRIPTION
02/03/2015	H	JZAMORANO	UPDATED NOTES

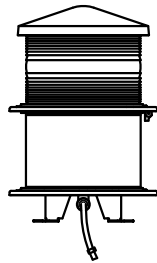
4

3

2

1

1



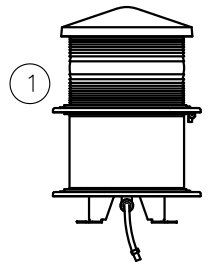
TOWER HT.  
351'/107M (MIN.)  
500'/152M (MAX.)

USE 3/4" PLUG FROM SIDE OF JUNCTION BOX

3/4 TOWER HT.

STAINLESS STEEL WRAPLOCK TO BE ATTACH TO OL CONDUIT EVERYWHERE IT MEETS STRUCTURE.

ATTACH TO STRUCTURE. TYPICAL SPACING EVERY 5'(MAX.).



1/2 TOWER HT.

STAINLESS STEEL WRAPLOCK TO BE ATTACH TO OL CONDUIT EVERYWHERE IT MEETS STRUCTURE.

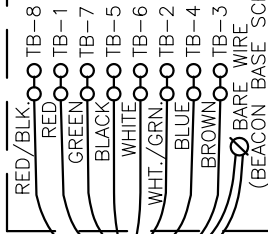
1/4 TOWER HT.

TO CONTROLLER

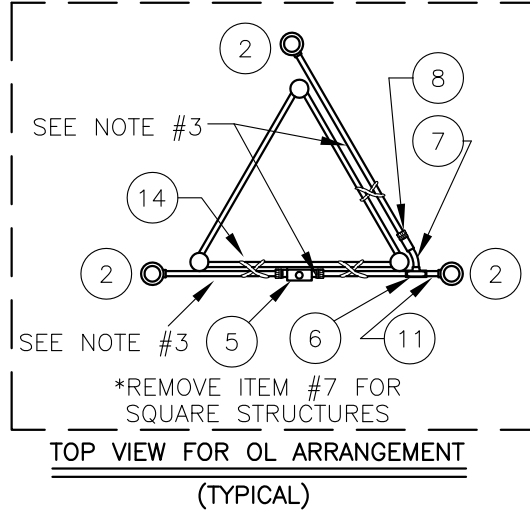
⊗ = TERMINAL

**BEACON BASE**

**CONNECTIONS COLOR CODED**

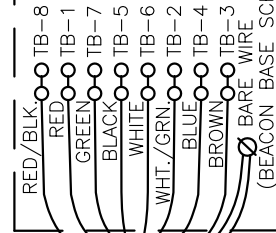


FOR MORE DETAIL REFER TO DRAWING 100489



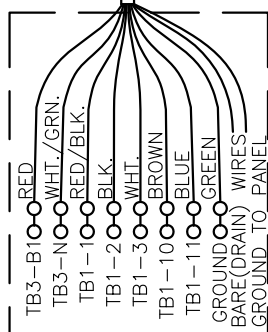
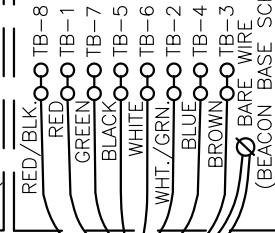
**BEACON BASE**

**CONNECTIONS COLOR CODED**

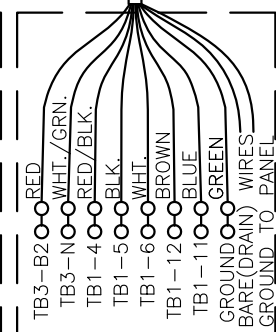


**BEACON BASE**

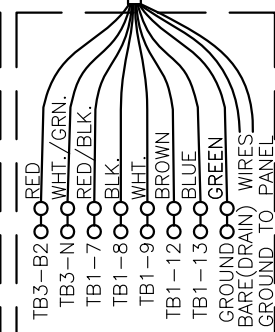
**CONNECTIONS COLOR CODED**



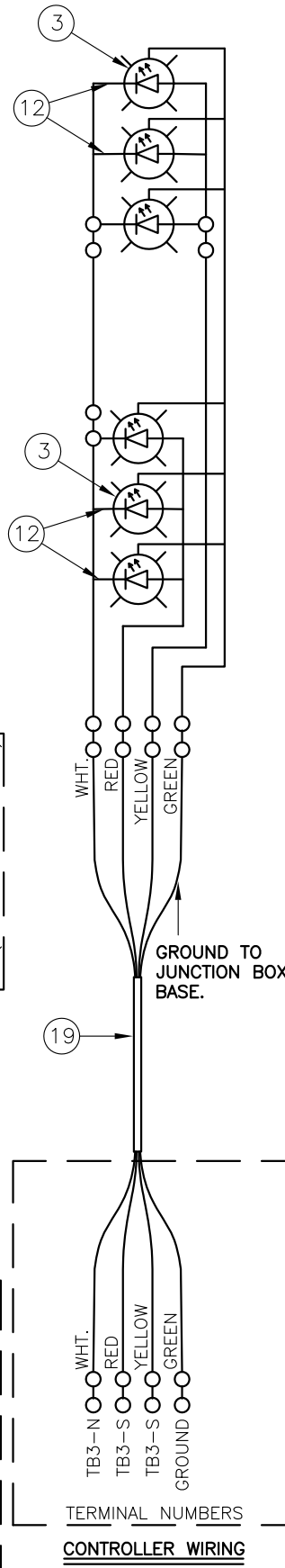
**CONTROLLER WIRING**



**CONTROLLER WIRING**



**CONTROLLER WIRING**



11/16/14 [D] ITEM 1

**BILL OF MATERIALS**

ITEM NO.	QTY.	TWR PART NO.	DESCRIPTION
1	3	STLDBEAON2A	DUAL STROBE/LED BEACON
2	6	OL1LED	LED SIDELIGHT 3/4"
3	-	-	-
4	3	CGB295SA	3/4" CORD CONNECTOR 0.50 - 0.625
5	2	JB5	3/4" JUNCTION BOX
6	2	T27CG	3/4" CONDULET W/COVER AND GASKET
7	2	EL3430	3/4" 30° ELBOW
8	6	HC402	3/4" NO THREAD CONNECTOR
9	6	A314	3/4" CONDUIT LOCKNUTS
*	10	PIPDOP	4 oz. PIPE DOPE
11	2	N34T3	3/4" x 3" NIPPLE
12	6	SLPIGTAIL25G	25' SIDELIGHT PIGTAIL WITH GROUND
13	-	STCABLETIE	STROBE CABLE TIES(TWR. HEIGHT ÷ 5 x 2.75)
14	1	SS5012	STAINLESS STEEL WRAPLOCK 50' (FOR OLS)
15	3	CABLEGRIP1	SINGLE EYE LACE MESH 0.5 - 0.62
16	8	CABLEGRIP3	SINGLE EYE LACE MESH 0.63 - 0.74
*	17	STH40301	E2/3DBSL DUAL LED BEACON CONTROLLER
18	60'	CONDUIT34	3/4" CONDUIT (FOR OLS)

ITEM NUMBERS #19-#22 ARE NOT INCLUDED IN THE KIT BUT ARE AVAILABLE UPON REQUEST, AND REQUIRED FOR INSTALLATION.

19	-	STCABLEOB	OBSTRUCTION LIGHT CABLE(3/4 TWR. HT.+30'/9M)
20	-	STROBCABLE-3	STROBE CABLE (TWR. HT. + 30'/9M)
21	-	STROBCABLE-3	STROBE CABLE (1/2 TWR. HT. + 30'/9M)
22	-	STROBCABLE-3	STROBE CABLE (1/2 TWR. HT. + 30'/9M)

\* = ITEMS NOT SHOWN

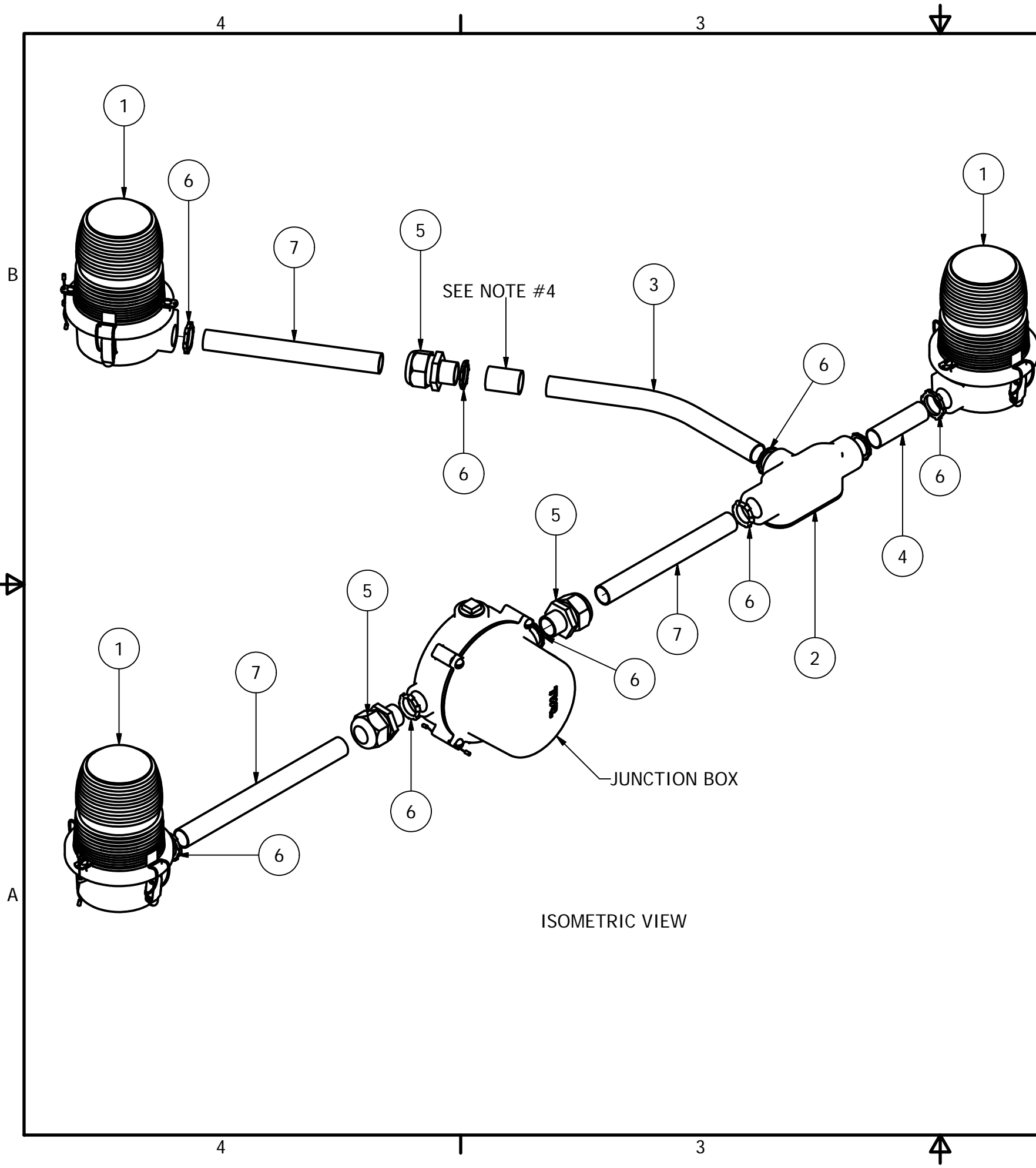
**NOTES:**

- 1) MOUNT BEACON HINGE SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.
- 2) ON AM RF TOWER APPLICATIONS, KEEP GROUND LUG FROM BEING CONNECTED TO EARTH GROUND. GROUND TO THE TOWER ONLY.
- 3) CUT CONDUIT34 TO LENGTH FOR PROPER EXTENTION OF OL1 (6"-12") FROM STRUCTURE. ATTACH ITEM HC-402 TO UNTHREADED CONDUIT TO COMPLETE ASSEMBLY.
- 4) USE COUPLING THAT IS PROVIDED WITH CONDUIT34 TO COUPLE ITEM EL3430 TO ITEM HC-402
- 5) THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE. TWR LIGHTING, INC. DOCUMENTATION SUPERSEDES THIS DRAWING & SHOULD BE REVIEWED PRIOR TO INSTALLATION OF THIS SYSTEM.
- 6) POWER SUPPLY IS NORMALLY MOUNTED AT EYE LEVEL ON TOWER. IT CAN ALSO BE MOUNTED INDOORS. RECOMMENDED MOUNTING HEIGHT IS 42" TO BOTTOM OF THE ENCLOSURE FOR EASE OF MAINTENANCE.
- 7) STROBE CABLE IS TO BE FASTENED TO TOWER STRUCTURE WITH PART NUMBER STCABLETIE. (ATTACH EVERY 5')

**LK1E2/3DBSL TOWER LIGHTING KIT CABLE RUN**  
(TOWERS 351'/107M TO 500'/152M)

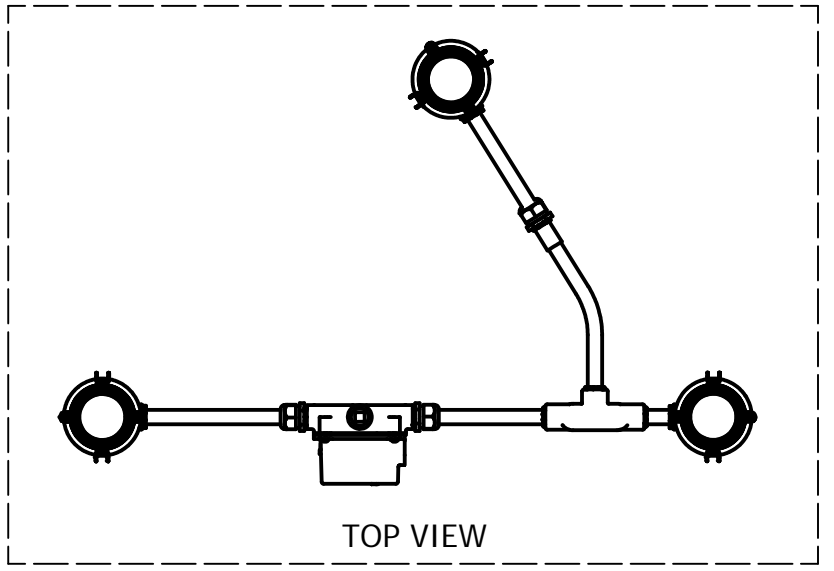
PROD DEPT	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology</i>	SHEET SIZE	SHEET QTY.
SERV DEPT		B	1 OF 1
ENGINEER			
DRAWN BY	E.A.SALAZAR	SCALE	N.T.S.
DATE	02/19/04	DWG. NO.	603

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Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	3	OL1/LED	3/4" OBSTRUCTION LIGHT
2	1	T27CG	3/4" CONDULET W/COVER AND GASKET
3	1	EL3430	3/4" 30° ELBOW
4	1	N34T3	3/4" X 3" NIPPLE
5	3	HC402	3/4" NO THREAD CONNECTOR
6	5	A314	3/4" CONDUIT LOCKNUTS
7	1	CONDUIT34	3/4" CONDUIT

- NOTES:
1. THIS DRAWING IS A TYPICAL INSTALLATION DETAIL FOR 3 OL-1 PER LEVEL SYSTEM.
  2. PART # EL3430 MAY BE OMITTED WHEN ARRANGING FOUR LEG TOWERS.
  3. PART # COUNDUIT34 CUT TO LENGTH FOR PROPER EXTENTION OF OL1 FROM STRUCTURE (6"-12"). ATTACH PART # HC402 TO UNTHREADED CONDUIT TO COMPLETE ASSEMBLY.
  4. USE COUPLING THAT IS PROVIDED BY PART # CONDUIT34.
  5. GREEN WIRE USED ONLY ON LED SIDELIGHTS



DRAWN jbustamante	1/4/2008	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology®</i> <b>SIDELIGHT MOUNT ASSEMBLY</b> (10' FACE WIDTH MAX)		
CHECKED				
QA				
MFG				
APPROVED				
		SIZE B	DWG NO 100489	REV A
		SCALE	SHEET 1 OF 1	

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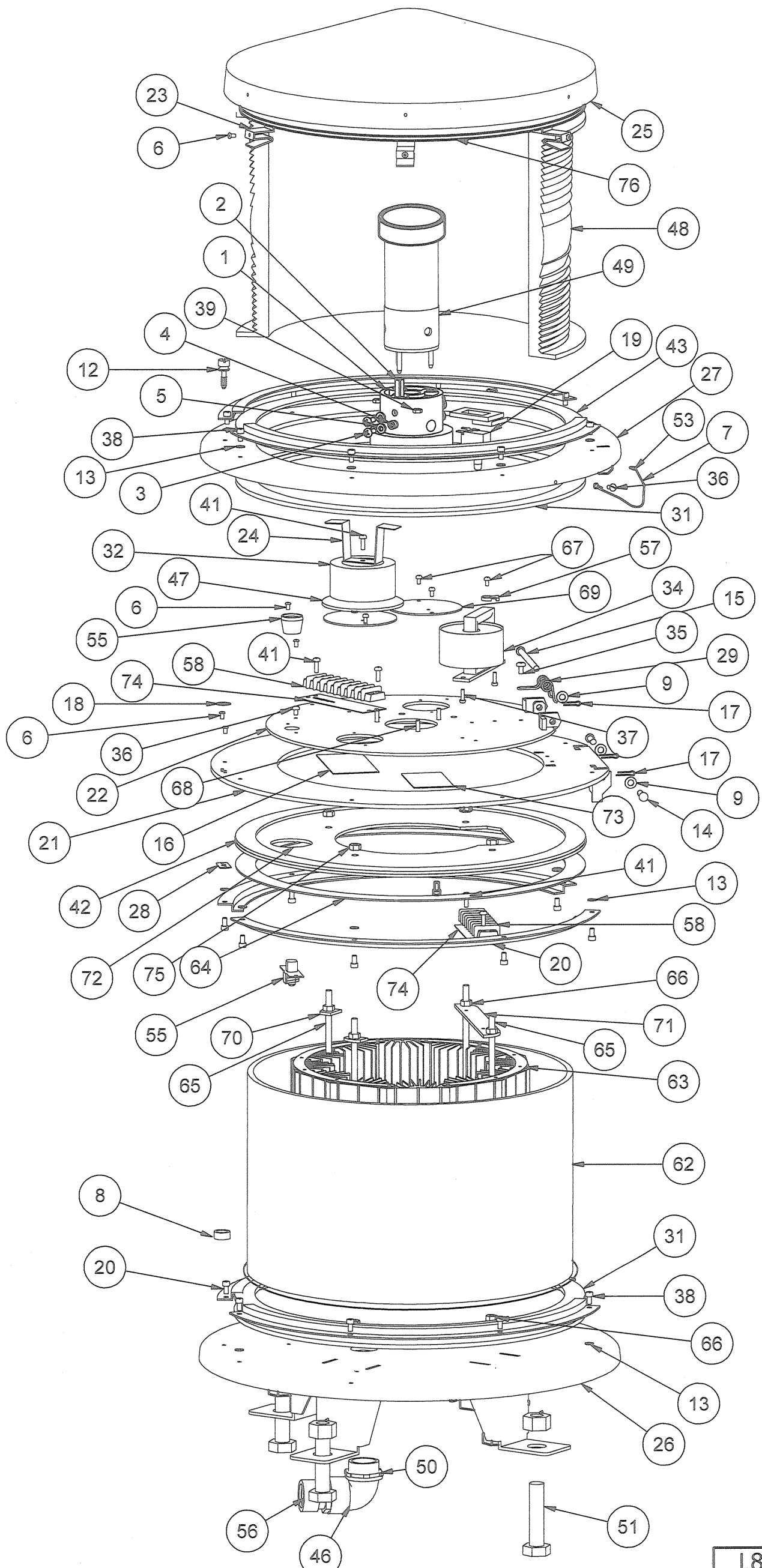
1

B

B

A

A



Parts List

ITEM	QT	PART NUMBER	DESCRIPTION
1	1	100319	DUAL BEACON FLASHTUBE SOCKET
2	3	BU27200	FLASHTUBE SOCKET INSERT
3	6	1032X12PHH	10-32 X 1/2 PHILLIPS BINDER SCREW
4	3	115510SS0	5/16 X 1/4 ROUND SS SPACER
5	3	1032FW	#10 SS FLAT WASHER
6	10	18PRSS-2	1/8 X .40 SS POP RIVET
7	2	7X7SS	1/16 HOL 7 X 7 SS WIRE
8	1	2-10000	CIRCULAR SPIRIT LEVEL
9	3	14FWDB	1/4 FLAT WASHER CH16L
10	2	* 18AWG BLU	#18AWG TEFLON BLUE WIRE
11	2	* 18AWG BRN	#18AWG TEFLON BROWN WIRE
12	1	121340712	DB QUICK OPEN CAPTIVE SCREW
13	24	8NFW	#8 NYLON FLAT WASHER
14	2	14X34CLVP	1/4 X 3/4 SHORT SS CLEVIS PIN
15	1	14X358CLVP	1/4 X 3-5/8 LONG SS CLEVIS PIN
16	1	STCONLAB2	Product Label
17	3	12SSCP	1/2" SS COTTER PIN
18	1	1261	SS RETAINER FOR QUICK OPEN
19	1	STJ02003	CHERRY SWITCH
20	6	100337	DUAL BEACON LENS RETAINER RING
21	1	100343	DUAL BEACON LOWER HINGE ASSEMBLY
22	1	100345	DUAL BEACON HATCH PLATE
23	6	100368	DUAL BEACON CAP BRACKET
24	1	100396	INDUCTOR BRACKET
25	1	100344	CAP DUAL BEACON
26	1	100672	LED BEACON BASE
27	1	100342	DUAL BEACON UPPER HINGE ASSEMBLY
28	1	121102013	DB QUICK OPEN SCREW FLAT RECEPTACLE
29	1	070-4500	DB HATCH SPRING SS DWG100558
30	1	* 16AWG BLK	#16AWG TEFLON BLACK WIRE
31	2	STBEAGSKT	GASKET NEOPRENE 13 1/4 X15
32	1	INDTRC3001	INDUCTOR .47MH TRANSFORMER
33	1	* 16AWG RED/BLK	#16AWG TEFLON RED/BLACK WIRE
34	1	STC05005	TRIGGER TRANSFORMER
35	1	1032X38PHH	10-32 X 3/8 PHILLIPS PAN HEAD SCREW
36	5	832X14PHH	8-32 X 1/4 PH SS SLOT SCREW
37	2	632X38PHH	6-32 X 3/8 PHILLIPS PAN HEAD SCREW
38	24	1032X38PHW	10-32 X 3/8 SS PHILIP HD CAPTIVE SCREW
39	3	832NUT	8-32 NUT
40	2	* 18RAD18277	T&B CONNECTOR
41	5	832X12PHH	8-32 X 1/2 PHILLIPS PAN HEAD
42	1	STBEAGSKT4	GASKET NEOPRENE 1/8 X 15
43	1	STBEAGSK2	GASKET NEOPRENE 3/16 X 15 1/4
44	14	* TYZ23M	HI TEMP TY WRAPS
45	1	* 14RB10R	T&B CONNECTOR
46	1	EL190S	1" 90 DEGREE SHORT ELBOW GALV
47	1	100394-02	INDUCTOR BOTOM PAD GASKET
48	1	STDBCLENS	CLEAR DB LENS
49	1	STFLSHTB8KIT	FLASH TUBE 2-TURN HELIX WITH HOOD CAP
50	1	A315	1" CONDUIT LOCKNUT GALVANIZED
51	4	58X112	A325 5/8 X 1-1/2 BOLT W/ANCO L/NUT
52	1	* HEATSHRINK2	1/2" GLUE BASE HEAT SHRINK
53	4	CSL062X100	1/16 COPPER SLEEVE
54	.25	* HEATSHRINK1	1/4" BLACK FIT 221- 1/4 BLK-100
55	1	162320141	SOUTHCO SPRING LATCH W/BLACK KNOB
56	1	CC-MPT-1-G	1" CORD CONNECTOR .700 TO .984
57	2	TYANCHOR	TY WRAP ANCHOR 23N3669
58	2	621R208	621 R2 08 TERMINAL BLOCK
59	11	* 18RA6FL	STAKON
60	7	* 14RB-6FL	14-16 AWG #6 LOCKING FORK
61	3	* KV10-8F-D	10-12 AWG #8 LOCKING FORK
62	1	STLDBCTUBE2	CLEAR ACRYLIC TUBE 18.5"
63	1	LEDLITEENG2A	120 VAC L-864 LED LIGHT ENGINE
64	1	STBEAGSK3	GASKET NEOPRENE 1/16 X 15-1/4
65	4	100727	1/4-20 X9 7/8
66	4	1420NUT	1/4-20 NUT W/NYLON
67	4	632X14PHH	6-32 X 1/4 PHILLIPS PAN HEAD SCREW
68	3	832X58PHH	8-32 X 5/8 PHILLIPS PAN HEAD SCREW
69	2	100599M	HATCH PLATE VENT COVER
70	2	100606I	RETAINING WASHER
71	1	100722	TERMINAL MOUNTING PLATE
72	1	100602M	TOP LED ENGINE PLATE
73	1	NONOEMLBL	NON-OEM PARTS WARNING LABEL
74	2	MS621XP08	MS621XP08
75	4	1420SSNUTN	1/4 20 S/S NUT W/NYLON
76	1	100634	TOP SEAL PLATE

\* = ITEMS NOT SHOWN

### L865/864 LED DUAL BEACON ASSEMBLY (STLDBEACON2A)

PROD DEPT  
SERV DEPT  
ENGINEER



DRAWN BY	J.ZAMORANO	SHEET SIZE	B	SHEET QTY.	1 OF 1
DATE	10/28/2014	SCALE	N.T.S	DWG. NO.	101008I

The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.

AUTHOR	DATE	REV	DESCRIPTION
JZAMORANO	03/03/2015	A	UPDATED B.O.M

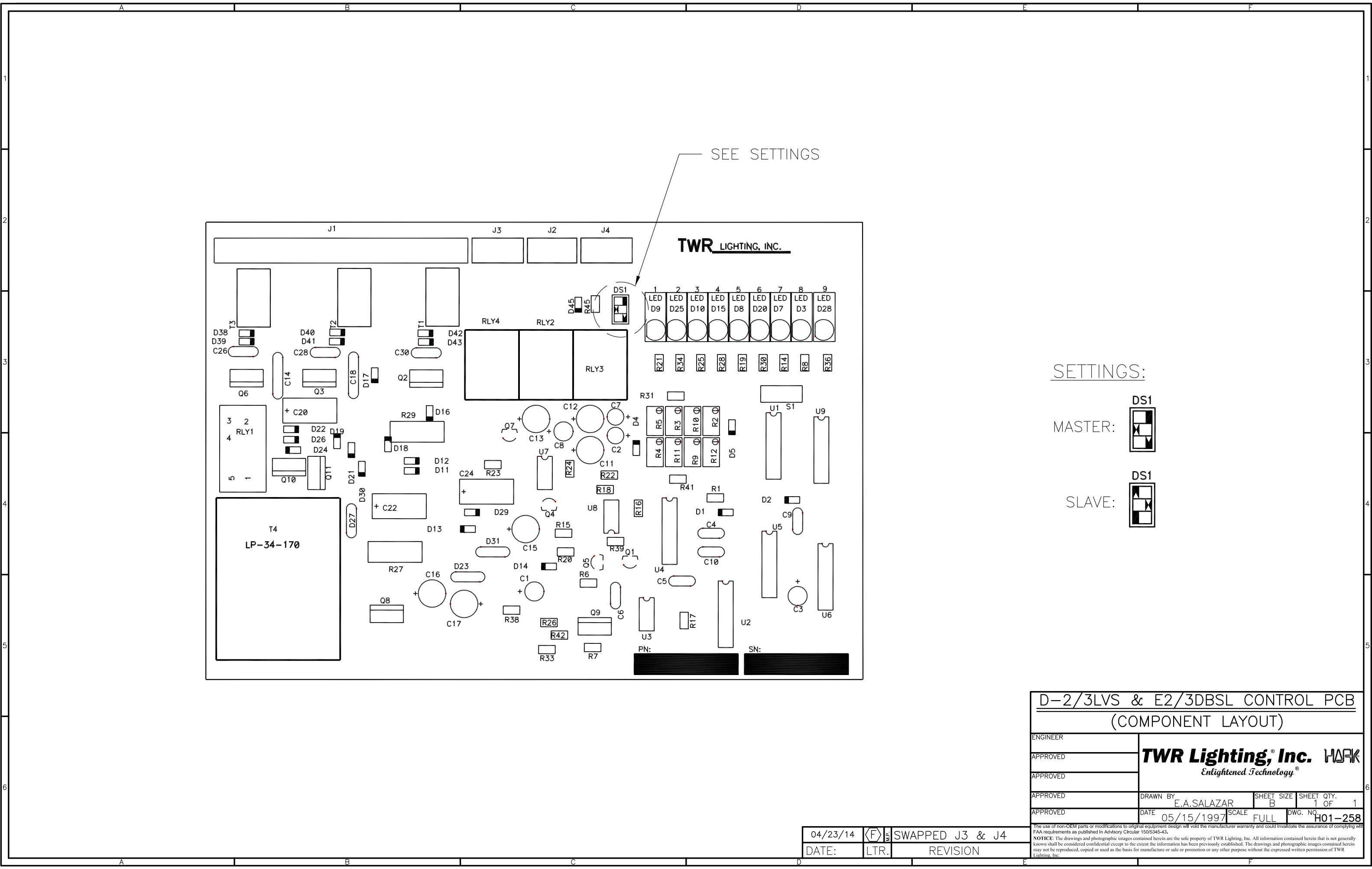
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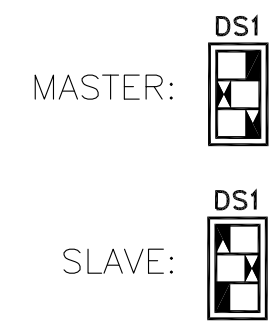
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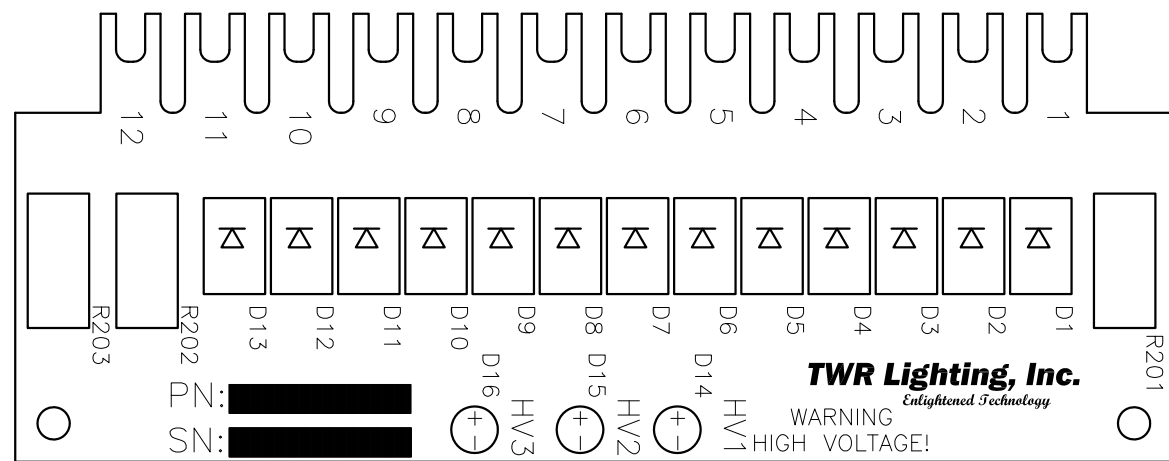
SETTINGS:



D-2/3LVS & E2/3DBSL CONTROL PCB (COMPONENT LAYOUT)			
ENGINEER			
APPROVED			
APPROVED			
APPROVED	DRAWN BY E.A.SALAZAR	SHEET SIZE B	SHEET QTY. 1 OF 1
APPROVED	DATE 05/15/1997	SCALE FULL	DWG. NO. H01-258

04/23/14	(F)	SWAPPED J3 & J4
DATE:	LTR.	REVISION

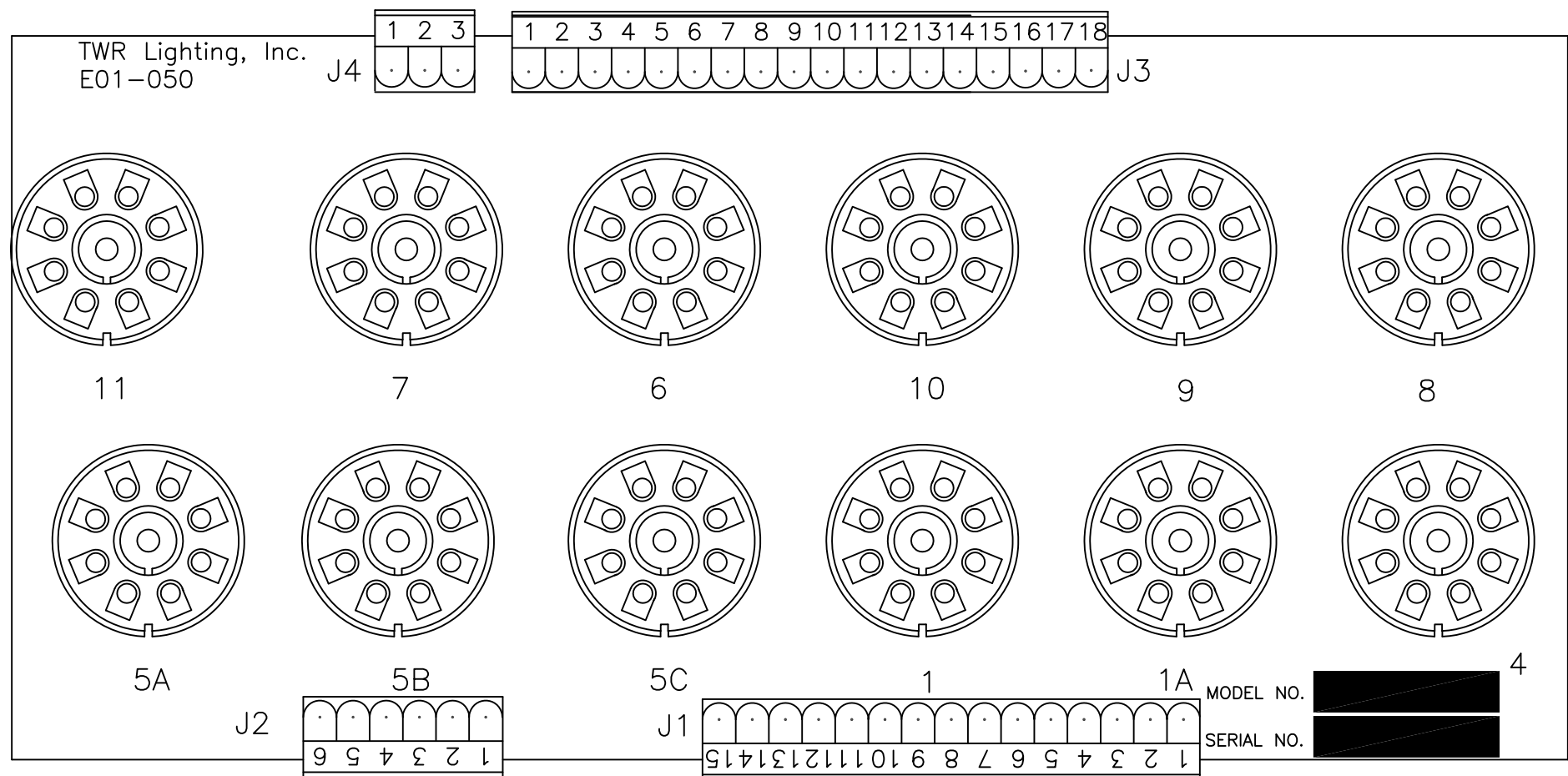
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<b>D-2/3LV/E-2/3DB(SL) SERIES HV RECTIFIER</b>			
<b>PCB2 L-865 MEDIUM INTENSITY STROBE</b>			
PROD DEPT	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology®</i>		
SERV DEPT			
ENGINEER			
DRAWN BY E.A.SALAZAR	SHEET SIZE B	SHEET QTY. 1 OF 1	
DATE 06/15/95	SCALE FULL	DWG. NO. H02-258A	
<small>The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.</small>			
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07/27/04	(C)	ADD E2/3DBSL
DATE:	LTR.	REVISION

TWR Lighting, Inc.  
E01-050



MODEL NO. [REDACTED]  
SERIAL NO. [REDACTED]

<b>E2/3DBSL RELAY PCB3 PART #STH03301A</b> <b>ALARM LOCKOUT ELIMINATION MODIFICATION</b>			
PROD DEPT			
SERV DEPT			
ENGINEER			
DRAWN BY E.A.SALAZAR	SHEET SIZE B	SHEET QTY. 1 OF 1	
DATE 07/13/06	SCALE N.T.S.	DWG. NO. H03-301A	
<small>The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.          NOTICE: The drawings and photographic images contained herein are the sole property of TWR Lighting, Inc. All information contained herein that is not generally known shall be considered confidential except to the extent the information has been previously established. The drawings and photographic images contained herein may not be reproduced, copied or used as the basis for manufacture or sale or promotion or any other purpose without the expressed written permission of TWR Lighting, Inc.</small>			

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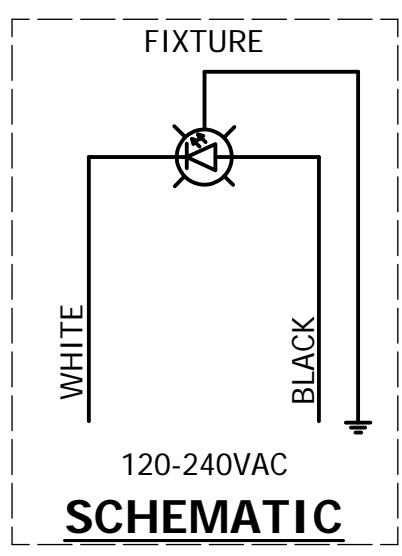
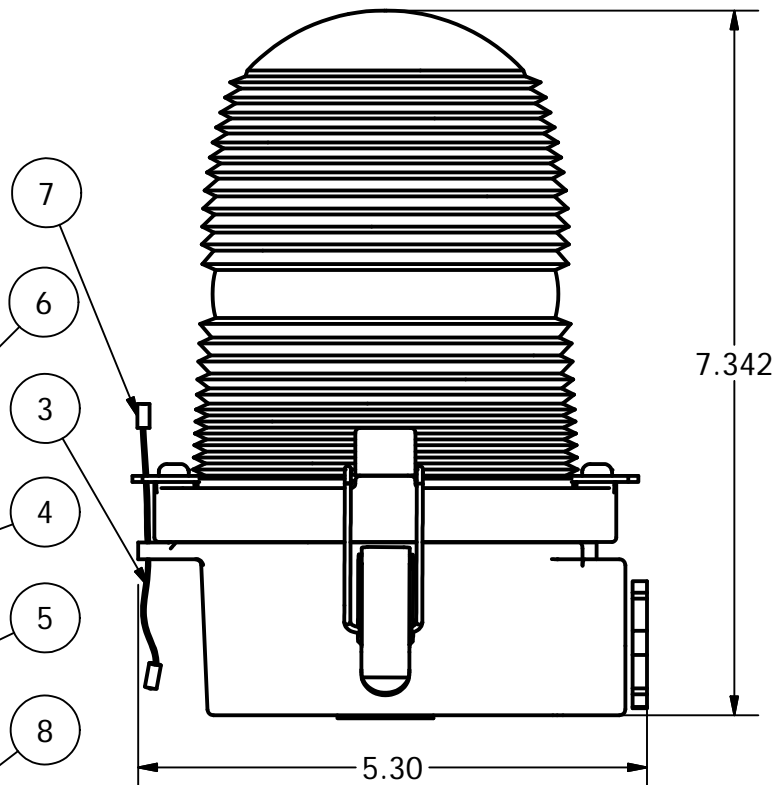
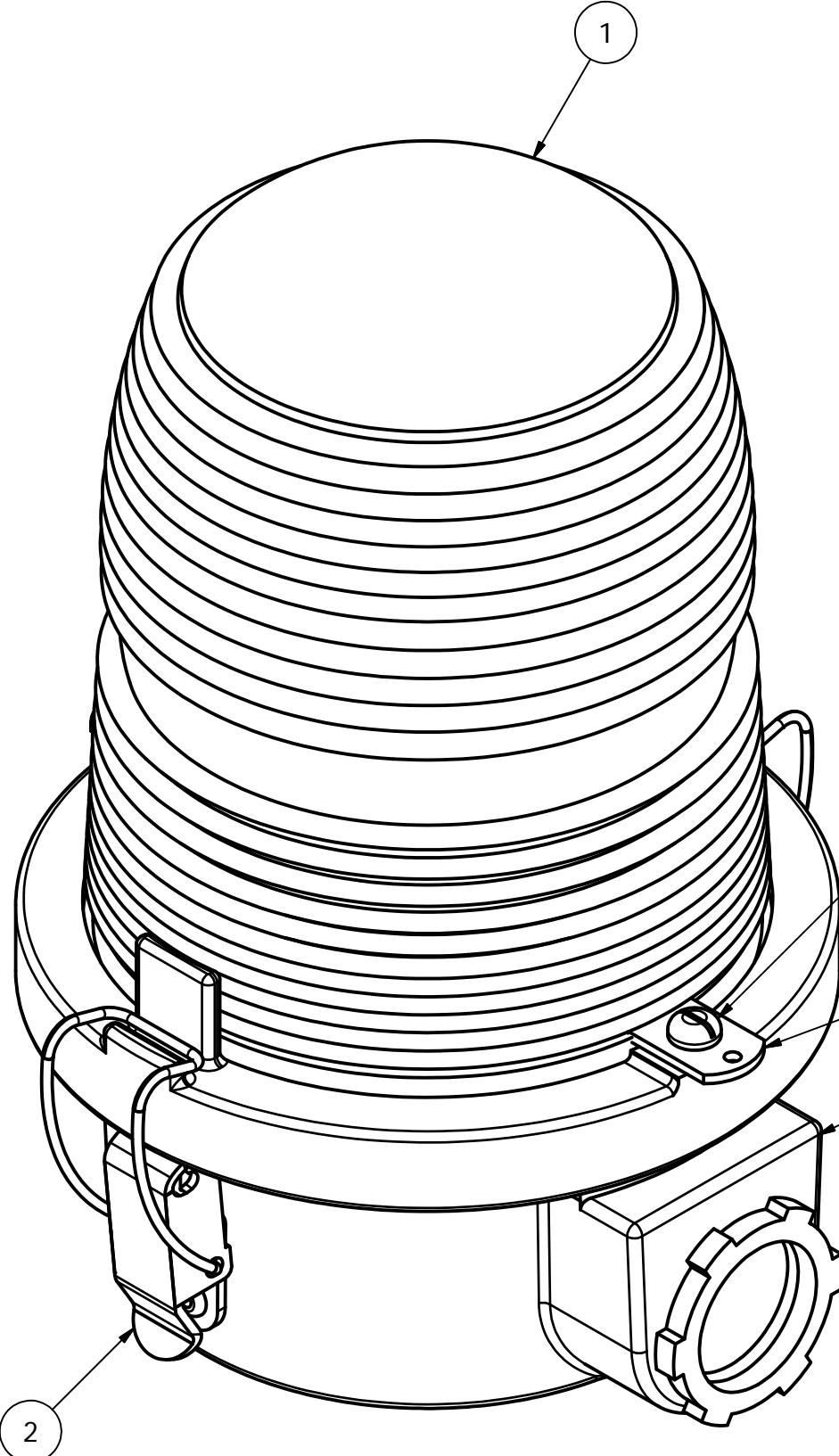
Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	OL1VLED2	L810 OBSTRUCTION LIGHT
* 1.1	1	100588_RE	OL 6LED BASE PLATE
* 1.2	1	100591	OL 6LED STAR DISK
* 1.3	1	100680	OL1/2 SERIAL # LABEL
* 1.4	1	A10290	5/32" ID RUBBER GROMMET
* 1.5	6	STD05008	LED EMITTER
* 1.6	1	OLG	OL GASKET
* 1.7	1	AP100846	SIDELIGHT LENS CLEAR ACYRLIC
* 1.8	1	106V	LENS HOLDER RING
* 1.9	6	STE01-047	LED VERTICAL PCB
* 1.10	16	18PRSS	1/8 X .45 SS POP RIVET
* 1.11	1	PS90-260/24	POWER SUPPLY
* 1.12	1	20RED	#20AWG RED BELDON WIRE
* 1.13	2	WIRENUTBLU	BLUE WIRE NUT
2	2	HC255SS	SIDELIGHT LATCH
3	1	7X7SS	1/16 HOL 7X7 S.S. WIRE
4	2	12V245	OL LENS CLIP
5	1	105V	SINGLE SIDELIGHT BODY
6	2	832X14PH	8-32 X 1/4 PH SS SLOT SCREW
7	2	A1A	STAKON CRIMP
8	1	A314	3/4" CONDUIT LOCKNUT GALV.

\* = ITEMS NOT SHOWN

B

B



\* GROUND WIRE MUST BE CONNECTED TO PROPERLY PROTECT POWER SUPPLY. FAILURE TO GROUND WILL VOID ALL WARRANTIES.

A

A

DRAWN	gsebek	8/18/2004
CHECKED		
QA		
MFG		
APPROVED		

**TWR Lighting, Inc.** **PARK**  
Enlightened Technology®

TITLE		
OL1VLED2 120-240VAC FAA-OL16LED (L810 OBSTRUCTION LIGHT)		
SIZE	DWG NO	REV
B	100656i	E
SCALE	SHEET 1 OF 1	

DATE	REV	AUTHOR	DESCRIPTION
11/07/14	E	JZAMORANO	REM. WIRE CONNECT

4

3

2

1

# AC UNITS CURRENT MEASUREMENT RM22JA31MRSP01

## 120VAC PRODUCT SPECIFIC SETTINGS

QTY.	PART NO.	INPUT	#1	#2	#3	#4	#5
1	OL1_LED2	E2	*<1	30	20	30	OFF
2	OL1_LED2	E2	*<1	50	20	30	OFF
3	OL1_LED2	E3	*<1	<b>15</b>	20	30	OFF
4	OL1_LED2	E3	*<1	25	20	30	OFF
6	OL1_LED2	E3	*<1	35	20	30	OFF
8	OL1_LED2	E3	*<1	45	15	30	OFF
10	OL1_LED2	E3	*<1	60	10	30	OFF
1	LEDBEAON2	E3	*<1	<b>20</b>	20	30	OFF
1	LEDBEAON2A	E3	*<1	<b>15</b>	20	30	OFF
1	LEDBEAON2(T)	E3	*<1	<b>25</b>	20	30	OFF
1	STLDBEAON2	E3	*<1	<b>20</b>	20	30	OFF
1	STLDBEAON2A	E3	*<1	<b>15</b>	20	30	OFF
2	STLDBEAON2A	E3	*<1	<b>25</b>	20	30	OFF
2	STLDBEAON2A	E3	*<1	<b>25</b>	20	30	OFF

\*NO MEMORY

### FUNCTIONS

- 1) Configuration: Selection of operation mode (<1 / >1 / >1<) with or without memory.
- 2) Adjustment of current threshold as % of setting range.
- 3) Hysteresis adjustment from 5% to 50%.
- 4) Time Delay adjustment from 0.1 to 30sec.
- 5) Diagnostic button.
- 6) Yellow indicator light (**See conditions below**)
- 7) Dial Pointer (Green) LED
  - Steady green LED indicates that supply to the RM22 is present
  - Flashing green LED indicates a setting has been changed that requires a power cycle.

### YELLOW LED CONDITIONS

**NOTE:** ( ) ASTERISK INDICATES LED CONDITIONS OPERATE OPPOSITE FROM RM22JA31MR MODULE

\*

- ➔ Steady Burn Fixtures
  - Yellow light \*off : Normal condition (no alarm)
  - Yellow light flashing : Undercurrent condition detected and time delay initiated
  - Yellow light \*on : Alarm condition
- ➔ Flashing Fixtures
  - Yellow light flashing inconsistent : Normal condition (no alarm)
  - Yellow light flashing consistent : Under current condition detected and time delay initiated

**NOTE :** To help troubleshoot or to set the sense current, turn the time delay to 0sec. Adjusting the current setting should only be done if it is known that all the lights are functioning. For Steady Burn adjust the current until the yellow LED comes \*off, and the relay is not dropping in and out. For Flashing Fixtures adjust the current setting until the yellow light starts to flash. This is the normal condition setting. Return the time delay back to 30sec.

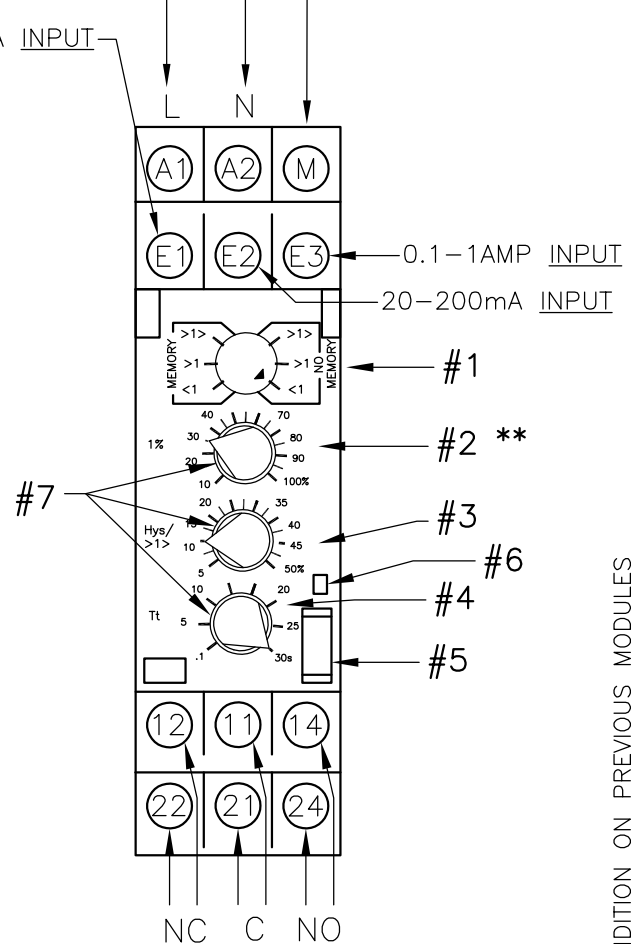
- Yellow light \*on : Alarm condition

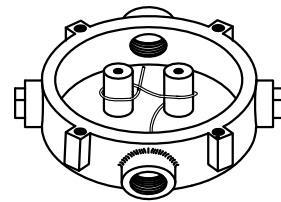
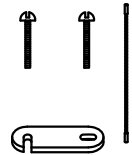
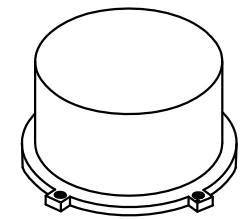
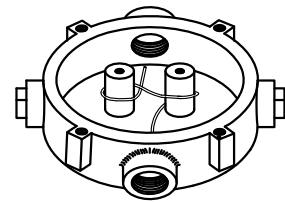
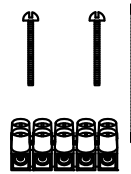
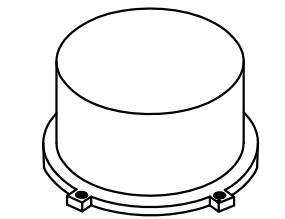
\*\* Due to current draw tolerances slight adjustments to setting #2 may be needed for proper alarming.

CONTROL VOLTAGE INPUT

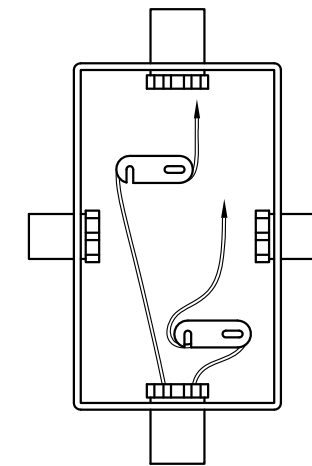
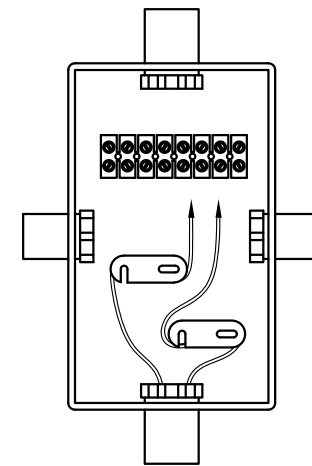
4-40mA INPUT

OUTPUT TO LOAD





JB-5 AND JB-0  
3/4" JUNCTION BOX



JB-8 AND JB-8SR  
1" JUNCTION BOX

**NOTES:**

- 1) DRAWING ILLUSTRATES METHOD OF STRAIN RELIEVING WIRE. USE THIS METHOD ON ALL JUNCTION BOXES.
- 2) THE NATIONAL ELECTRICAL CODE-ARTICLE 300-19-B3 REQUIRES CONDUCTORS IN A VERTICAL CONDUIT BE SUPPORTED TO RELIEVE STRAIN ON TERMINAL BLOCK CONNECTIONS.
- 3) SKETCH ILLUSTRATES METHOD OF STRAIN RELIEVING A SINGLE CONDUCTOR. SEVERAL CONDUCTORS MAY BE GROUPED TOGETHER.
- 4) CONDUCTORS MAY BE MIXED BUT SHOULD NOT TAKE UP MORE THAN 40% OF CONDUIT'S INSIDE AREA.

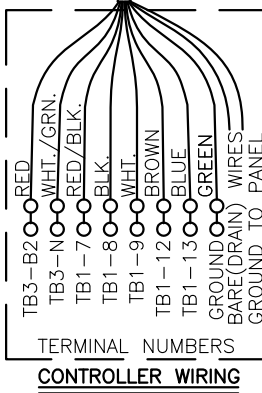
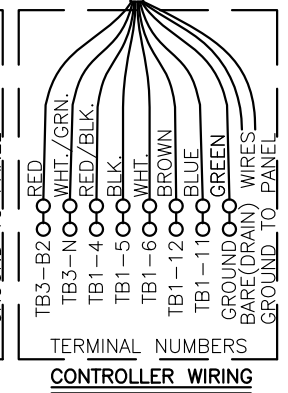
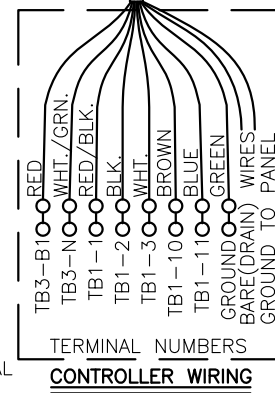
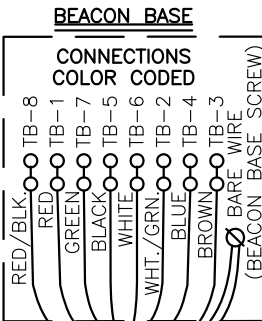
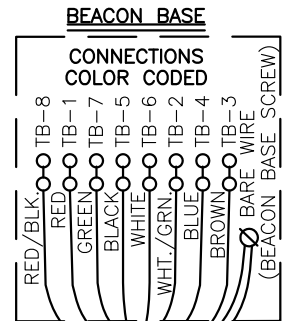
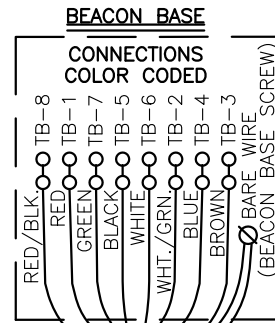
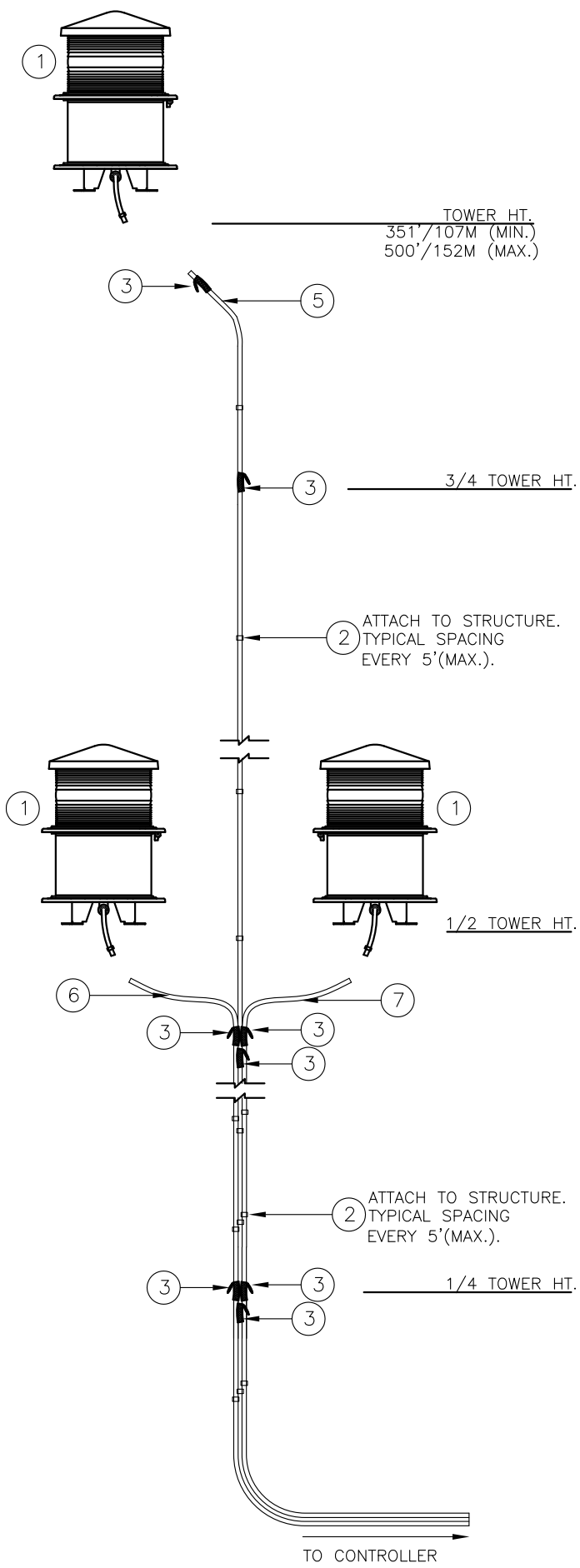
USING THIS JUNCTION BOX METHOD SPACING IS 100 FEET MAXIMUM.

AWG WIRE SIZE	MAX. NUMBER WIRES IN 3/4" CONDUIT	MAX. NUMBER WIRES IN 1" CONDUIT	WIRE AREA SQ. INCHES	WEIGHT PER 100 FEET
12 THHN	16	26	0.0117	2.50
10 THHN	10	17	0.0184	4.10
8 THHN	6	9	0.0373	6.70
6 THHN	4	7	0.0519	10.30
4 THHN	2	4	0.0845	16.20

<u>JUNCTION AND STRAIN RELIEF BOXES</u>					
PROD DEPT	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology®</i>				
SERV DEPT					
ENGINEER					
DRAWN BY	G.D. SEBEK	SHEET SIZE	B	SHEET QTY.	1 OF 1
DATE	07/26/93	SCALE	N.T.S.	DWG. NO.	100089

9/29/00	(A)	UPDATED NOTES
DATE:	LTR.	REVISION

The use of non-OEM parts or modifications to original equipment design will void the manufacturer warranty and could invalidate the assurance of complying with FAA requirements as published in Advisory Circular 150/5345-43.  
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⊘ = TERMINAL

**BILL OF MATERIALS**

ITEM NO.	QTY.	TWR PART NO.	DESCRIPTION
1	3	STLDBEACON2A	DUAL STROBE/LED BEACON
2	-	STCABLTIE	STROBE CABLE TIES(TWR. HEIGHT ÷ 5 x 2)
3	8	CABLEGRIP3	SINGLE EYE LACE MESH 0.63 - 0.74
4	1	STH40301	E2/3DBSL DUAL LED BEACON CONTROLLER
* ITEM NUMBERS #5-#7 ARE NOT INCLUDED IN THE KIT BUT ARE AVAILABLE UPON REQUEST, AND REQUIRED FOR INSTALLATION.			
5	-	STROBCABLE-3	STROBE CABLE (TWR. HT. + 30'/9M)
6	-	STROBCABLE-3	STROBE CABLE (1/2 TWR. HT. + 30'/9M)
7	-	STROBCABLE-3	STROBE CABLE (1/2 TWR. HT. + 30'/9M)

\* = ITEMS NOT SHOWN

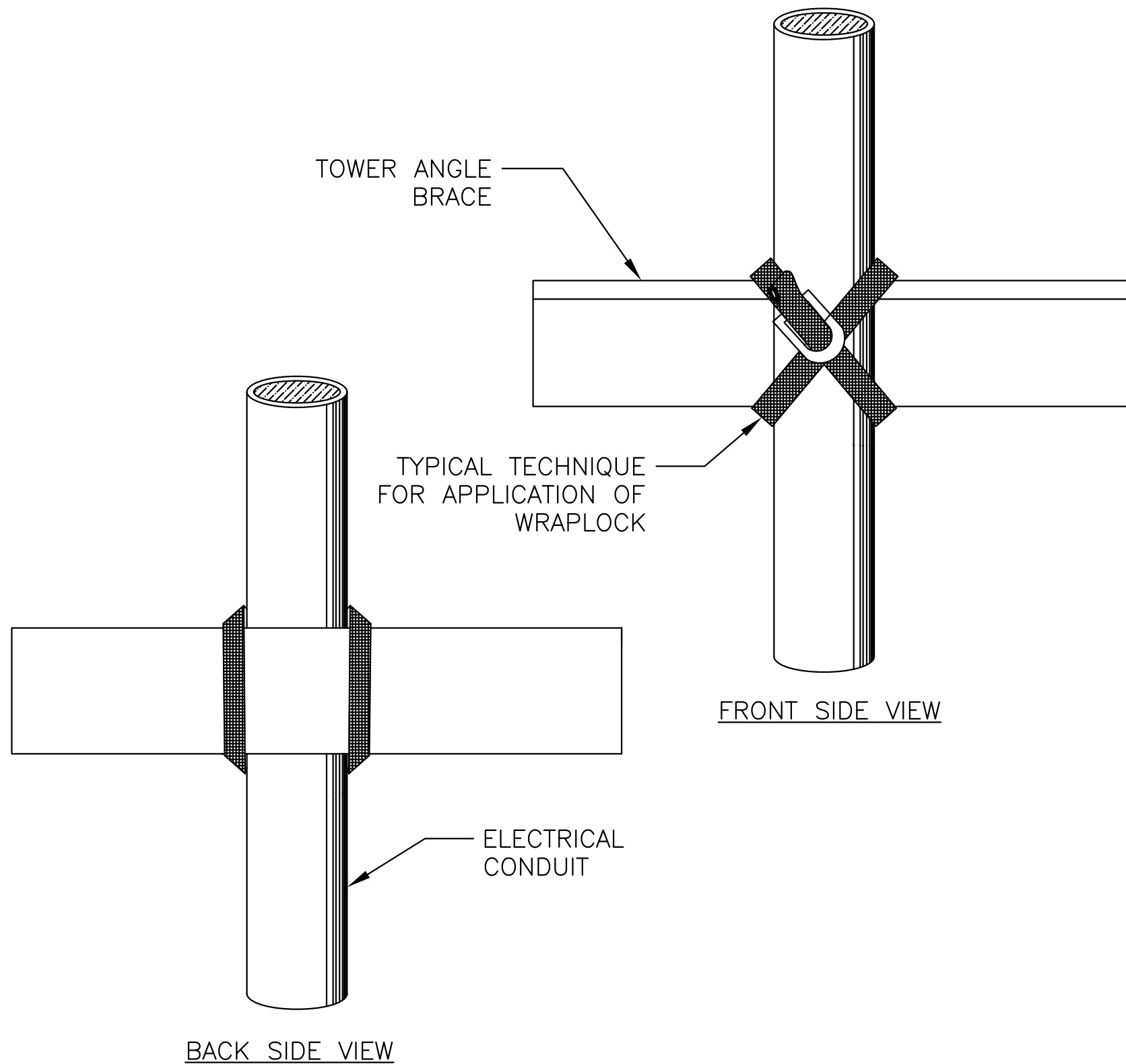
**NOTES:**

- 1) MOUNT BEACON HINGE SO LENS WILL OPEN UNOBSTRUCTED BY STRUCTURE.
- 2) ON AM RF TOWER APPLICATIONS, KEEP GROUND LUG FROM BEING CONNECTED TO EARTH GROUND. GROUND TO THE TOWER ONLY.
- 3) THIS DRAWING IS PROVIDED AS A GENERAL REFERENCE. TWR LIGHTING, INC. DOCUMENTATION SUPERSEDES THIS DRAWING & SHOULD BE REVIEWED PRIOR TO INSTALLATION OF THIS SYSTEM.
- 4) POWER SUPPLY IS NORMALLY MOUNTED AT EYE LEVEL ON TOWER. IT CAN ALSO BE MOUNTED INDOORS. RECOMMENDED MOUNTING HEIGHT IS 42" TO BOTTOM OF THE ENCLOSURE FOR EASE OF MAINTENANCE.
- 5) STROBE CABLE IS TO BE FASTENED TO TOWER STRUCTURE WITH PART NUMBER STCABLTIE. (ATTACH EVERY 5')

**LK5E2/3DBSL TOWER LIGHTING KIT CABLE RUN**  
**(TOWERS 351'/107M TO 500'/152M)**

PROD DEPT	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology</i> <b>WORK</b>	SHEET SIZE	SHEET QTY.
SERV DEPT		B	1 OF 1
ENGINEER			
DRAWN BY	M.PETERMAN	SCALE	N.T.S.
DATE	12/11/2013	DWG. NO.	603-07

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## DIRECTIONS FOR USING WrapLock

CUT OFF BAND TO PROPER LENGTH.  
(SEE TABLE ON COVER OF BOX)

1.— PASS ONE END THROUGH YOKE AND BEND BACK ABOUT 1 1/2" AND FLATTEN DOWN.



2.— PASS BAND AROUND WORK AND THROUGH YOKE.



3.— REPEAT AND PASS END THROUGH A SECOND TIME, DRAW UP FREE END SNUGLY WITH PLIERS.



4.—



INSERT FREE END IN SLOT OF RATCHET.

5.—



TURN DOWN UNTIL CLAMP IS TIGHT.

6.— BACK OFF SLIGHTLY TO REMOVE RATCHET. CLAMP IS NOW SECURELY LOCKED.

**TO REMOVE WrapLock**  
UNCOIL END WITH RATCHET. PRESS DOWN AT POINT WHERE BAND METAL HAS BEEN FORCED THROUGH CURVED PART OF YOKE.

### WRAPLOCK FASTENING DETAIL

ENGINEER	<b>TWR Lighting, Inc.</b> <i>Enlightened Technology®</i>		
APPROVED			
APPROVED			
APPROVED	DRAWN BY M. PETERMAN	SHEET SIZE B	SHEET QTY. 1 OF 1
APPROVED	DATE 05/01/2014	SCALE N.T.S.	DWG. NO. 100984

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